THESIS /
REPORTS
Molitor, A.

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FINAL REPORT FOR COOPERATIVE AGREEMENT Nr.
INT088323-COA with
UNIVERSITY OF MONTANA
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Communicating Appropriate Behavior in Occupied Grizzly Bear Habitat to Backcountry Visitors

by

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March 1992

Printed on Recycled Paper

Preface

This study is the result of many years' effort involving many people and their continued enthusiasm for finding ways of better communication to backcountry visitors as well as their interest in protecting Montana's magnificent grizzly bear population. Reducing human impacts and confrontations with bears means that our children will enjoy what we now tenuously experience.

We want to thank Bob Lucas (now retired) of the Intermountain Research Station for his initial interest and arranging much of the financial support for the study. The USDA Forest Service Flathead National Forest generously permitted us to conduct the research at Jewel Basin. Tim Hammond, Neal Christensen and Steve Martin helped with the field data collection. And, the study could not have been conducted without the cooperation of the many hikers and backpackers that completed the study questionnaire. For their help, all we can say is "Thank you".

This research was supported in part by funds provided by the U.S. Department of Agriculture, Forest Service, Intermountain Research Station, and the University of Montana School of Forestry through the McIntire-Stennis Forestry Research program.

INTRODUCTION

Human - Bear Confrontations

As society encroaches farther and farther into the last remaining islands of our nation's wild lands, the grizzly bear, once a wild, free-roaming creature, is forced to seek refuge in the remote mountains of the Yellowstone and Northern Continental Divide Ecosystem. Backcountry visitors seeking to experience the wonders of snow-capped peaks and alpine meadows frequent these remaining vestiges of grizzly bear habitat, resulting in occasional but nevertheless serious confrontations with bears. Recreational use of backcountry areas may have been decreasing in recent years (Roggenbuck and Lucas 1987, Lucas and McCool 1988), yet the rate of bear-human confrontations has increased. Though difficult to obtain accurate statistics, approximately one visitor per million (Table 1) has had an incident with a bear in Glacier National Park over the past 25 years (GNP 1990). Backcountry and wilderness managers face the challenge of providing implicitly safe recreation opportunities to the public as well as protecting the grizzly bear.

To reduce confrontations and allow for the co-existence of humans and bears, backcountry managers have recognized the necessity for effective bear management plans. Much of the emphasis of these plans is directed at managing the recreational use that occurs in occupied grizzly bear habitat. Often management actions include the temporary closure of

Table 1. Human-bear confrontations that resulted in human injury or death, visitation levels, and confrontation rates for Glacier National Park.

Period	Confrontations	Visits	Confrontation[1] Rate
1961-1965	3	3,629,000	.83
1966-1970	4	4,006,000	1.00
1971-1975	6	5,049,000	1.19
1976-1980	9	11,161,000	.81
1981-1985	8	9,185,000	.87
1986-1990	11	8,849,000	1.24

[1]Confrontations per million visits

trails and areas frequented by bears, and rely upon providing information to backcountry visitors to persuade them to engage in appropriate behaviors that should ultimately reduce actual conflicts. For example, information programs currently developed by state and federal agencies attempt to educate the user about proper camping, cooking and food storage techniques; bear avoidance strategies; bear behavior, signs, movements, and ecology; and the inherent risks associated with hiking in grizzly bear habitat.

Past research has found information to be an effective management tool for modifying several types of recreation visitor behavior, such as redistributing visitors, minimizing campsite impacts, and reducing recreation conflicts among visitor groups (see, for example, Krumpe and Brown 1982, Oliver et al. 1985, Dowell and McCool 1986). Nevertheless, managers and researchers have questioned the success of wilderness education program efforts. For example, Lucas and others (1985) suggested:

> *". . . more needs to be done to identify the key information that we supply to visitors, how to best convey this information, how to determine whether education produces the desired behavior, and finally, how to evaluate the performance of different educational approaches as well as other management strategies."*

This need is most graphically illustrated by Cella and Keay's (1979) study of visitor use of appropriate camping practices necessary to prevent a confrontation with a bear in the Yosemite National Park backcountry. They reported that 95% of the visitors contacted received a brochure on proper food storage techniques. While 92% of the visitors queried believed they were properly storing their food, observation by the researchers indicated that only 3% were actually doing so. Though a majority of the backcountry visitors had received the information, only a few were actually persuaded to engage in appropriate behavior.

Problem Statement

Much of the past research on wilderness education has investigated the effectiveness of a single type of persuasive communication strategy. Very little research has examined a variety of persuasive strategies in one setting and context. For example, the effectiveness of fear appeals has been tested in several recreation settings containing hazards (i.e. grizzly bears, flash floods) as a means for gaining behavioral compliance (Hodgson 1974, Sipprell 1984). A high fear persuasive communication appeal may be deemed effective if a significant amount of attitude and behavioral change occurs. However, if the effectiveness of this strategy was tested simultaneously with other persuasive communication strategies, results may reveal that one specific strategy is significantly more effective than the others. Are high fear messages more effective than ecologically oriented messages? Do behavioral manipulations result in greater behavioral compliance than persuasive messages? Will exposing an individual to a combination of persuasive communication strategies result in greater behavioral compliance than exposure to a single persuasive communication strategy? How do the characteristics of recreationists (i.e. past experience, knowledge, attitudes) influence the effectiveness of specific types of persuasive communication strategies?

Since data indicates that bear-human encounters are increasing, that potential encounters can be reduced by engaging in several specific behaviors and that information programs are the preferred management technique for persuading individuals to practice these behaviors, we need to examine how a

variety of persuasive communication strategies can influence visitor behavior in occupied grizzly bear habitat. Thus, this study will address the following research question: **What are the most effective persuasive communication strategies for persuading backcountry users to engage in the appropriate behaviors while travelling in occupied grizzly bear habitat?**

Study Objectives

This study seeks to enhance the ability of backcountry managers to effectively communicate to backcountry visitors the appropriate behaviors necessary for backpacking in occupied grizzly bear habitat. Understanding how to do this should help decrease human-bear confrontations occurring in the last vestiges of grizzly country. More specifically, the objectives of this study are to:

1. identify the types of persuasive communication messages recreationists prefer and tend to expose themselves to, as well as identify the types of messages individuals feel are the most influential in altering their beliefs about engaging in a particular behavior;
2. assess backcountry users' behavioral intentions, reported behavior, and actual behavior concerning the appropriate behaviors necessary for backpacking in occupied grizzly bear habitat;
3. determine the effects various written messages explaining the proper procedures for backpacking in grizzly bear habitat may have on individuals' backcountry behavior;
4. determine the effects various behavioral-based persuasion strategies may have on individuals' backcountry behavior;
5. assess visitors' knowledge about bears, attitudes toward bears and attitudes toward appropriate behavior. Visitors' experience levels, knowledge and attitudes may explain differences in the effectiveness of persuasive communication strategies.
6. Identify which persuasion strategy (message, behavioral or combination) is the most likely to increase backcountry users' compliance in appropriate behavior.

LITERATURE REVIEW

Information as a Management Tool

To maintain the overall characteristics of a wilderness experience (e.g. freedom, escape, solitude), many managers prefer indirect management techniques for dealing with recreationally induced impacts (Washburne and Cole 1983). These techniques provide primarily unobtrusive and subtle means for modifying or influencing visitor behavior. Most common are physical alterations of backcountry facilities (trails, campsites, access roads); eligibility requirements (entrance fees, knowledge tests); and information dispersal (Hendee et al. 1978). Since the public appears to react more favorably to control by information than by regulation (Bury and Fish 1980), education and information programs are the most frequently employed methods for solving backcountry visitor problems (Washburne and Cole 1983, Krumpe 1985). Max Peterson (1985), the former Chief of the Forest Service, declared the use of education and information to be a more effective means of improving wilderness management than the use of heavy regulation. He defined the challenge of wilderness management as 90% information and 10% regulation.

Managers use information to achieve several objectives associated with modifying visitor behavior. First, information has been successfully used as a means for redistributing visitor use both among sites within an area and among different recreation areas. Managers seek to shift recreational use primarily to reduce use in areas prone to high biophysical impacts, to reduce visitor encounter levels in order to provide greater opportunities for solitude and to match recreational opportunities to recreationists' desired experiences. For example, Krumpe and Brown (1982) provided backcountry visitors to Yellowstone National Park with a "trail selector" guide. The trail selector guide provided information on alternative hiking opportunities in the Yellowstone backcountry. When provided with a trail selector, 30% of the backcountry visitors selected alternate routes.

Second, information has also been used for reducing visitor-induced impacts such as inappropriate campsite selection, inappropriate disposal of trash and human waste, and inappropriate visitor activities. Oliver et al. (1985) tested the effectiveness of information given to recreationists in developed campgrounds. Observation of campground behavior indicated a 50 to 80 percent reduction in depreciative behavior, depending upon the method of information dispersal. Additionally, in an experiment with Boy Scouts, Dowell and McCool (1986) found that the "Leave No Trace" education program increased minimum impact knowledge levels and skills.

A major portion of wilderness education programs involves persuasive efforts geared toward altering inappropriate behavior. A major assumption of these education programs is that once visitors receive information they will adopt the recommended behaviors, an assumption obviously not met in Cella and Keay's (1979) study.

Education programs are designed to teach a person certain factual information (Petty and Cacioppo 1981). Persuasive communication efforts expand one step further the goal of education. Persuasion is a communication process in which the communicator seeks to elicit a desired response from the receiver (Anderson

1971). Figure 1 illustrates the persuasive communication process in a very simple, primitive form. A source sends a message via a channel to a receiver.

However, the reception, comprehension, and acceptance of the message can be influenced by many social-psychological and setting factors making persuasive communication a very complex process (Figure 2). Briefly, the model demonstrates that information affects behavior indirectly. Once a message is received and accepted, certain changes in beliefs and attitudes may occur, which in turn may affect the recipient's intentions to perform a suggested behavior and eventually the actual behavior.

Though many managers favor the use of education and information over regulation and enforcement in dispersed and natural recreation settings (McCool and Lucas 1989), little research has evaluated the effectiveness of information campaigns (Brown et al. 1987). Much of the research on communication program effectiveness appears to involve one or several components of the persuasion process which may influence program success. For example, Anderson and Manfredo (1986) investigated the timing of information dispersal to wilderness visitors. They determined that visitors are more receptive to information received before entering a resource area. Visitors indicated that they would prefer managers not to post information within resource areas.

Several studies have investigated the effectiveness of various communication methods and mediums. Schwabb (1982) determined that methods involving active participation, such as visitor inquiries and simulations, are the most effective environmental education techniques. Fazio (1979) examined the effectiveness of various communication mediums for communicating with backcountry recreationists. An automated sound-slide show was deemed to be more effective for persuading visitors to engage in low impact camping techniques than mass media (TV, newspapers) attempts and on-site brochures.

Lastly, several studies suggest that the individual characteristics of backcountry visitors can also influence the effectiveness of communication programs. Williams and Huffman (1986) examined how visitors' levels of experience can influence the use of information programs. Experienced backcountry visitors to Rocky Mountain National Park were less likely to use trail information than novices or inexperienced visitors. The researchers also determined that highly specialized recreationists tended to seek out additional trail information explaining specific trail attributes.

Understanding when and how visitors prefer to be exposed to information can allow managers to develop more effective communication programs. However, if the objective of the information program is to change recreation behavior, managers need to be concerned with whether the message is accepted, yielded to and applied. Merely exposing visitors to informatio n does not

Figure 1. Simple model of persuasive communication process.

SOURCE ----> MESSAGE ----> RECEIVER ----> BEHAVIOR
(Channel, Media)

guarantee behavior change. Exposure may produce attitude change or an increase in knowledge levels (i.e. message acceptance), but acceptance does not always result in behavioral change. Unfortunately, much of the research focusing on the linkage between information, attitudes and behavior in grizzly country indicates a relatively weak relationship between attitudes and actual behavior.

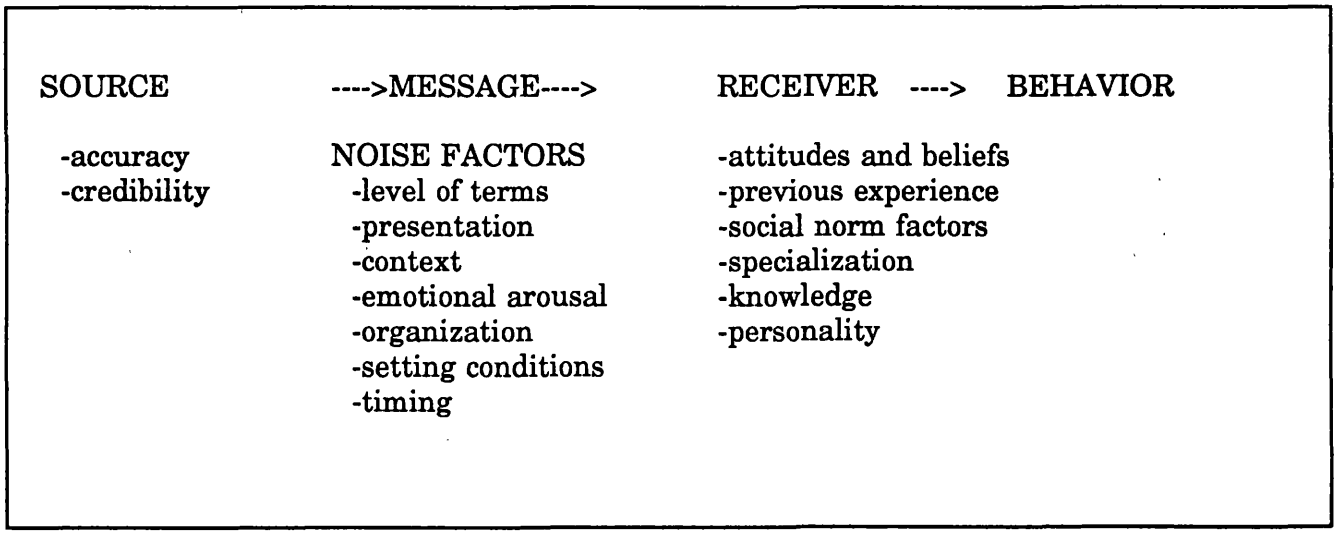
Information, Visitor Attitudes and Behavior in Grizzly Country

Fishbein and Ajzen (1975) state that understanding human behavior requires linking beliefs and attitudes with behavioral intentions. However, past research indicates that favorable attitudes toward a given behavioral alternative do not inevitably result in the selection of that alternative. For example, Jope and Shelby (1984), in their study of interactions between hikers and grizzly bears, stated that visitor attitudes toward bears are difficult to change and may not be directly related to the behaviors that actually cause or avert confrontations. They stated attitudes can be affected by how a person perceives a risk, deals with danger and uncertainty and responds when a hazard is present. Often people may react to bear warnings with an "it can't happen to me" attitude.

In a survey of visitors to Glacier National Park, Mihalic (1974) found that 65% had positive attitudes toward bears, in which respondents felt bears were an important component of the natural ecosystem. Twenty percent of the visitors had negative attitudes toward bears with the remainder (15%) having neutral attitudes. Mihalic found that reading outdoor literature, past experience, or knowledge about bears had little effect on these attitudes. When given a hypothetical bear encounter, most respondents chose the "correct" course of action. The behavioral intentions of the respondents, however, were unrelated to attitude intensity.

This lack of a linkage among information, attitudes and behavior may explain Chester's (1977) findings in his study of human-bear interactions in Yellowstone. The study revealed that a considerable number of backcountry users engaged in activities that could increase the probability of an encounter with a

Figure 2. Variables associated with principal components of persuasive communications.



grizzly bear. Many visitors (21%) travelled in small groups (1-2 persons) that are more prone to observe or encounter wildlife than larger groups (>5 persons). Also, sixty percent of the backcountry users stated that they used fresh or canned food during their trip, rather than the recommended less odorous freeze dried foods.

Consistent with Chester's findings, Sunderstrom's (1985) evaluation of Denali National Park's efforts to educate visitors of the appropriate behaviors necessary for bear country revealed that visitors were engaging in behaviors that may increase the likelihood of an incident with a bear. Most respondents felt that written information was the most effective interpretive method for communicating knowledge about bears; however, backcountry visitors tended to regard oral information as the most effective. Additionally, an evaluation of the relationship between visitor knowledge and behavior indicated knowledge was of little help in predicting behavior.

Ten years after Chester's study, Trahan (1987) found Yellowstone's information program to be somewhat more effective in altering human behavior. He examined visitor attitudes, the effectiveness of information programs and human behavior concerning grizzly bear dangers in the backcountry. Most respondents felt that grizzly bears did not represent a significant danger for hikers in the backcountry. However, many respondents indicated they would like to get close enough to a grizzly bear for a "good look", a behavior that is contradictory to minimizing confrontations with bears. Most visitors reported that they made noise while hiking, kept a clean camp and stored their food in trees; all of which should reduce the likelihood of a confrontation with a bear. Visitors reported that the most important sources of information about bear dangers were printed materials handed out at the park entrance, and the information on signs and bulletin boards.

On the other hand, Maw's (1987) study of visitors to Waterton Lakes National Park in Canada indicated that 80% of the respondents considered bears to be somewhat dangerous; however, the visitors generally had positive attitudes toward them. It was further determined that individuals with high knowledge levels concerning the biology of bears were more likely to exhibit positive attitudes toward bears. Identifying the most reliable characteristics for distinguishing grizzly bears from black bears was the basic gap in visitor knowledge concerning bear biology. Attitudes and knowledge were found to be related to actual behavior in some situations, but unapparent in others. For example, over 80% of the respondents considered bears to be dangerous; however, 55% indicated that they took no precautions to prevent an encounter with a bear. Therefore, the message that "bears are dangerous" is being transferred to the visitor, but the portion of the message indicating the need to engage in specific behaviors to reduce the amount of danger associated with travelling in occupied grizzly bear habitat either is not being received or accepted.

McCool and Braithwaite's (1988) study of backcountry users' behavior in Glacier National Park also reported confusing and uncertain linkages among information, attitudes and behavior. This study showed that the strength of ecologistic beliefs (i.e. the bear is an essential component of a naturally functioning ecosystem) was positively correlated with knowledge about grizzly bear biology, knowledge of appropriate behavior and an understanding of the consequences of appropriate behavior (in terms of reducing potential confrontations). Negativistic beliefs (i.e. bears should be avoided) were negatively

or disassociated with these variables. Participation in appropriate behaviors was positively correlated with ecologistic beliefs with the exception of the distance a respondent wished to get from a bear. In other words, individuals scoring higher on ecologistic beliefs wanted to get closer to bears than individuals scoring lower on this scale. Visitors seemed to be accepting and complying with the message 'be careful at campsites and along trails', but the message 'keep a safe distance from bears' may be counterbalanced in highly ecologistic individuals by their motivation to actually see a bear in the wild.

This research indicates that even though backcountry visitors receive persuasive messages, the information may not always influence behavior in a positive manner. Some messages are being accepted and applied, but other messages are not. Other messages stimulate attitude change, but actual behavior remains the same. Since managers of occupied grizzly bear habitat are primarily interested in gaining compliance with appropriate behavior, future research needs to identify the specific persuasive communication strategies that stimulate backpackers to engage in appropriate behavior while in the backcountry.

Theories of Persuasion

It has been stated earlier that wilderness education and information programs often involve persuasive efforts designed to alter inappropriate backcountry behavior. Rangers attempt to persuade backcountry users to engage in specific behaviors while in the backcountry. Ajzen and Fishbein (1980) state that the primary goal of persuasion is to change or produce certain behaviors. Persuasion is defined as the manipulation of symbols designed to influence another's beliefs about, attitudes toward, and/or behaviors with respect to some specific object (e.g. situation, person, issue, product, etc.) (Devine and Hirt 1989).

Persuasion is a process, it is not an outcome. Often the effectiveness of persuasive communication programs is assessed by examining outcomes. Did behavioral change result from exposure to persuasive messages? Devine and Hirt (1989) argue that the key to a successful communication or information program is understanding the processes that lead to an outcome. Why does one persuasive strategy appear to be effective in one situation and ineffective in another? Though the primary goal of a persuasive communication program may be outcome-oriented (i.e. attitude change, behavior change), understanding the persuasion process should allow program planners to strategically design messages such that desired goals (i.e. outcomes) are achieved. Persuasive communication programs assume that once individuals receive information, they will adopt the advocated attitudes or behavior. The Cella and Keay (1979) study graphically illustrated that this is not always the case.

The adoption of behaviors is a complex process involving many social-psychological factors. Often it is difficult to pinpoint those components of the communication process that may make information programs effective for changing inappropriate behavior. This chapter reviews the relevant communication literature which examines the factors influencing the effectiveness of persuasive communication attempts at altering inappropriate behavior. The literature review will guide the development of a conceptual framework for analyzing the effects of persuasive communication on backcountry behavior in occupied grizzly bear habitat.

Persuasion Strategies

Devine and Hirt (1989) introduce two general approaches to influencing

behavior: the message-based and behavioral based models of persuasion. A major assumption of message-based persuasion theories is that producing attitude change will result in behavioral change. In other words, these theories assume a unidirectional influence from attitudes to behavior (**A ---> B**). In message-based persuasion, strategies involve attempts to form or change attitudes directly through message factors. If a positive attitude is elicited from exposure to a message, it is assumed that behavior consistent with that attitude will occur.

Behavior-based persuasion operates in the opposite manner of message-based persuasion. The persuader manipulates the environment such that target individuals engage in some behavior. The attitude formed subsequently would be based on positive experiences from engaging in the behavior. Behavior precedes attitude ($\mathbf{B_1}$ **---> A**). Individuals utilize behavior as an important source of information which guides the formation and modification of an attitude. Also incorporated into the behavior-based model is the assumption of the message-based model that once an attitude is formed, behavior will occur consistent with that attitude ($\mathbf{B_1}$ **---> A --->** $\mathbf{B_2}$). The following discussion examines these two approaches in greater depth.

Message-Based Persuasion

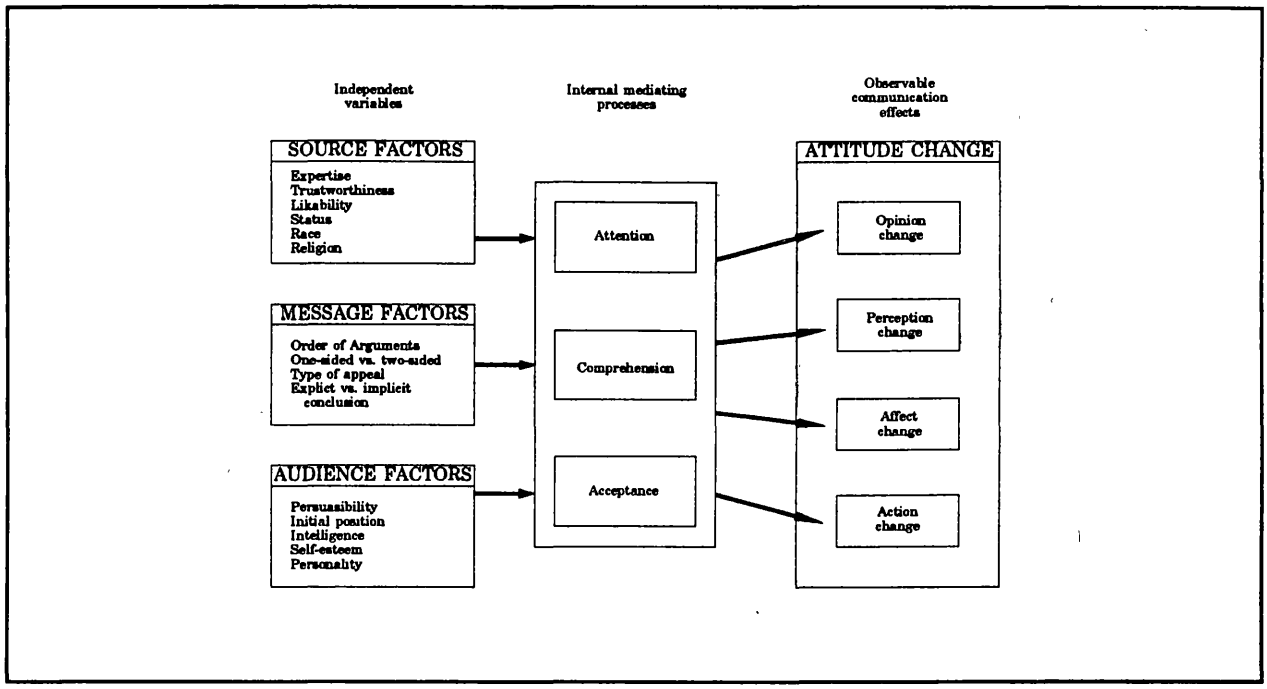
Message-based communication involves the use of written and verbal messages to influence attitudes and behavior. Individuals are exposed to messages consisting of a set of arguments in favor of a particular attitude object. The communication is expected to influence individuals to adopt the positive attitudes toward the object. Lastly, it is assumed that adoption of the positive attitudes will result in positive behavior toward the object. In other words, individuals receive a message, adjust their attitudes and behave according to their adjusted attitude. As indicated earlier, many persuasive communication programs assume that providing information to individuals is enough to persuade individuals to adopt recommended attitudes and behaviors.

Most message-based persuasive communication theory has been stimulated by the Yale Communication Research Program developed by Carl Hovland in the late 1950's (Fishbein and Ajzen 1975). The Yale Program investigated those elements that influence the effectiveness of persuasive communication by examining the fundamental processes and external factors of the communication process (Figure 3). This model is primarily concerned with how attitudinal changes may occur according to the extent to which a message is attended to, comprehended, and accepted.

Additionally, several independent variables may influence the effectiveness of the communication process. Source, message and audience factors may affect the level of attendance, comprehension, and acceptance to a message. The manipulation of these particular factors may both facilitate and inhibit attitude change. For example, a high fear appeal may cause a person to feel uneasy, resulting in a reduction of the individual's attention level; however, the individual's acceptance level of the message may increase to lessen this response of uneasiness (Fishbein and Ajzen 1975).

McGuire (1968) expanded the Yale Model by introducing the two-factor model. McGuire states that persuasion involves two basic steps: "the reception of the message content and yielding to what is comprehended." Adding these factors to the Yale Model results in five processes: attention, comprehension, yielding, retention and action. McGuire also adds to the Yale approach another independent

Figure 3. Yale approach to communication and persuasion (adapted from Fishbein and Ajzen 1975).



factor that may affect the communication process, channel medium or the manner in which a message is transferred to the receiver. Therefore, combining the two approaches results in four independent variables which may influence persuasiveness: source, message, channel and receiver.

Later, McGuire (1981) introduced the information processing model. Similar to the two-factor model, the model suggests that persuasion occurs via five stages: exposure, attention, comprehension, yielding and retention of the message. The model indicates that after these five stages have occurred, individuals will engage in actions or behaviors consistent with the message, if the message and one's attitude can be recalled from memory. These stages are assumed to occur in a fixed sequence. If one of the stages fails to occur, the process stops. For example, if an individual does not comprehend the message (i.e. it may be too difficult or complex to understand), the individual will not be able to yield to the message.

Much of the empirical research involving this theoretical framework has focused on manipulations of the independent variables. A multitude of studies have investigated manipulations of the message (e.g. one vs two-sided, fear arousal, humor, message repetition, message complexity, etc.), the source (e.g. attractiveness, credibility, similarity to message recipients, etc.), the media channel (e.g. written, verbal, television, movies, etc.) and the audience (e.g. knowledge levels, personality, cognitive responses, etc.). Research examining the manipulation of the above variables will be reviewed in greater depth later.

The key to the information-processing model is the yielding stage. If yielding does not occur, behavior will not be affected. Past research has indicated certain factors that may enhance the potential for yielding to occur (e.g. highly credible sources). However, the model

does not indicate **why** yielding occurs. What processes are involved in yielding? By not specifying the processes involved in the five stages, it could be concluded that the information-processing model is an outcome-based model. As discussed earlier, information program planners should be more interested in the process of persuasion rather than the outcome of the program. Understanding the process of persuasion will allow program designers to more effectively produce messages to achieve desired goals or outcomes.

When persuasive communication programs elicit responses other than the desired, they are often labelled as ineffective. If message recipients respond with attitude changes in an opposite direction than expected, a boomerang is said to occur. These boomerang effects are difficult to explain from an outcome-based model. Though fear appeals have been successful in creating positive attitude change, the boomerang effect has been a common occurrence in fear arousal studies (see, for example, Higbee 1969). In other words, the outcome is the opposite of what was desired. If the outcome is examined exclusively (i.e., outcome based), no information is available as to why the boomerang occurred. An examination of the processess involved in the communication are necessary to determine why the outcome was opposite from that desired. Since the outcome-based models do not specify the processes involved in persuasive communication programs, the information-processing model provides little assistance in explaining apparent program ineffectiveness.

Therefore, a deeper understanding of the components and processes involved in persuasion is necessary to shed light on factors leading to effective information programs. It is well-known in social-psychology, as well as in more specific recreation settings, that human responses to public information campaigns are related to attitudes, perceptions, knowledge, cognitive abilities and motivation. The following discussion examines one message-based, process-oriented model: Fishbein and Ajzen's (1975) theory of reasoned action. The model assumes that behavior can be directly affected by persuasive communications aimed at strengthening or modifying individual's attitudes. Thus, the model focuses on explaining behavioral changes rather than attitude change exclusively.

Theory of Reasoned Action

Fishbein and Ajzen (1975) developed an alternative model to persuasive communication that expands considerably on the traditional approaches of Hovland and McGuire. According to the traditional approach, manipulations of source, message, channel and receiver features (i.e. independent variables) will influence what is received and the extent to which information is accepted. Most studies following these approaches obtain a measure of message reception, but few directly assess message acceptance and yielding. The major assumption of these approaches is that if individuals receive a message, they also accept and yield to the message. Past research indicates that this is not always the case (see, for example, Cella and Keay 1979).

The theory of reasoned action provides a detailed approach for examining the processes intervening between the manipulation of independent variables and changes in the dependent variable. Contrary to the traditional approaches, the emphasis of this theory is on the dependent rather than the independent variables. Fishbein and Ajzen suggest that the primary dependent variable in persuasive communication is proximal beliefs. Proximal beliefs are "an individual's belief directly corresponding to an informational item." Through a series

of intervening communication processes, changes in proximal beliefs can occur. If proximal beliefs are altered via the communication process, then changes in other dependent variables such as attitudes, behavioral intentions and behavior are likely. Therefore, any persuasive attempt, whether the goal be to change an attitude, intention or behavior, must always be directed at individuals' beliefs.

To change proximal beliefs, it is necessary to identify the salient beliefs which an individual holds prior to exposure to a persuasive message. Once these are identified, developed messages should incorporate information based on desired proximal beliefs.

Persuasive communication messages should basically consist of a set of belief statements which correspond to a proximal belief held by the receiver. Associated with each belief statement in the message are two probabilities: (1) source probability or the strength of the source's belief, and (2) proximal probability or the strength of the receiver's initial belief.

How can a message produce a change in proximal beliefs? Consider the following message: There is a 90 percent chance the wolf will be extinct from the continental United States by the year 2000. The source probability is .90. Once an individual has been exposed to the message, two factors must be examined. First, to what degree is the individual likely to accept the source belief. If the receiver's postexposure probability equals the source probability, complete acceptance of the source belief occurred. Therefore, if the receiver of the above message indicated a subjective probability of .90 that the "wolf will be extinct by the year 2000," complete acceptance of the message occurred. Acceptance could be measured by determining whether or not the receiver's subjective probability is that "there is a 90% chance the wolf will be extinct by the year 2000."

The second factor of concern is the amount of change in proximal beliefs expected after exposure to the message. For example, prior to exposure to the message a receiver could indicate a subjective probability of .60 that "wolves will be extinct by the year 2000." If the receiver indicated a subjective probability of .90 after exposure, a change of .30 would be recorded. Acceptance of source belief and change in proximal belief are clearly not the same. By assessing change, researchers can determine the effects of information on beliefs. If acceptance of source beliefs is measured exclusively, investigators will not be able to determine if change has taken place. The potential for change in beliefs depends upon the discrepancy from source beliefs. The greater the absolute difference between source and proximal probabilities, the more belief change can occur.

The example above indicates a positive change in proximal beliefs. How does Fishbein and Ajzen's model account for "boomerang" effects? Source probability could be .60 that "the wolf will be extinct by the year 2000." A receiver could indicate a subjective probability of .90. Potentially, a boomerang could occur after the individual is exposed to the message from the source. Fishbein and Ajzen state that boomerang effects can be avoided by identifying the salient beliefs which individuals hold prior to message development and exposure.

In addition to proximal beliefs, the dependent variable may also be behavioral intentions or actual behavior. Changes in beliefs do not necessarily ensure that overt behavioral changes will occur. An individual may change proximal beliefs, but belief change may not lead to behavioral change. Fishbein and Ajzen state that behavioral intentions predict actual behavior. Two variables, attitudes

about the behavior and its consequences, and social normative influences on message receivers, affect behavioral intentions (Figure 4).

Belief change can affect the attitude component of the model. An individual's attitude toward a specific behavior is a function of the beliefs about an object's attributes or consequences of a specific act and the evaluation of these attributes and consequences. As a person develops or changes beliefs about the object from direct observation or exposure to information, attitudes toward the object are automatically established or refined.

Though belief change may occur and attitudes may be adjusted in a positive direction toward a specific object or behavior, the adjustment may not necessarily be evident in overt behavior. The social normative component may be overriding or influencing overt behavior more than the attitudinal component. Additionally, individuals may have a positive attitude toward the behavior and intend to engage in the behavior, but the individual may not possess adequate resources for engaging in the behavior. Thus, a boomerang effect may be witnessed.

Fishbein and Ajzen argue that many factors may influence the probability of acceptance. These factors can influence either individuals' confidence in their own beliefs (i.e. proximal probability) or individuals' perceptions that the source probability is correct. Similar to Hovland and McGuire, the authors define these factors as source, message, and receiver variables. The manipulation of these factors can either facilitate or inhibit the probability of acceptance. The following review defines each of these factors and recent research examining the effectiveness of various manipulations of these factors on beliefs, attitudes and behavior.

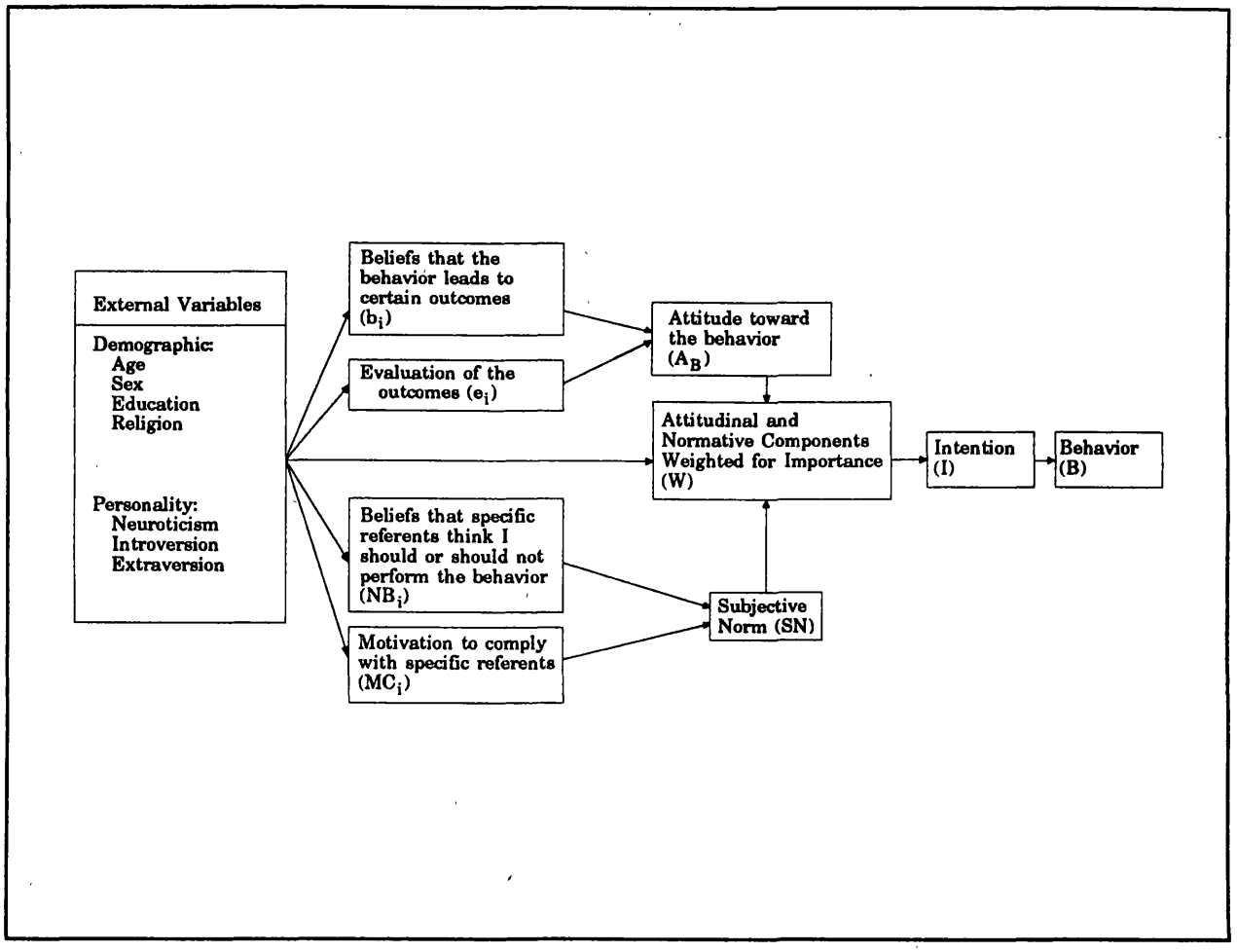
Source Factors

Source factors consist of characteristics associated with the message communicator. Such characteristics are credibility, expertise, trustworthiness, attractiveness, sincerity, status, etc. Manipulation of these characteristics are assumed to facilitate message receivers' perceptions of the source belief, thus increasing the probability of acceptance.

Much research has investigated the attitudinal and behavioral effects of communicator or source credibility. Source credibility is a set of perceptions held by the message receiver pertaining to the source of the message (King 1975). Most results of source credibility studies have suggested that high credibility sources are more persuasive than low credibility sources. For example, in a study of dental hygiene, Olson and Cal (1984) indicated that the high credibility source, a dental researcher, was much more influential on dental care attitudes than the low credibility source, a high school student who had written a paper on dental hygiene. In another study, Heesacker and others (1983) found that an increase in source credibility can enhance the amount of cognitive thought about a message, especially for those individuals not likely to thoroughly examine message content. A number of additional studies have also supported this hypothesis (see, for example, Bannister 1986, Clark and Maass 1988, McNeill and Stoltenberg 1988).

However, recent evidence has surfaced contrary to the popular source credibility hypothesis. Research has indicated that high credibility sources are not always more persuasive than moderate or low credibility sources (Petty and Cacioppo 1981). This suggests the use of highly credible sources will not always result in desired attitude or behavioral change. For example, an individual who is approached by, and on their own volition,

Figure 4. The theory of reasoned action (Ajzen and Fishbein 1980).



chooses to listen to a person who advocates the destruction of all nuclear weapons may be more persuaded if the person is unattractive, similar to them and moderate in credibility than if the person is highly attractive, powerful and high in credibility. Additionally, a study of persuasive feedback from work supervisors indicated that those supervisors perceived as highly credible were no more influential at increasing workers commitment to their jobs than those supervisors perceived as low in credibility (Bloom and Hautaluoma 1987).

Message Factors

Message factors can influence both receivers' confidence with their proximal beliefs and confidence with the source's belief. Characteristics, such as the order of presentation, validity of arguments, and appeal type can affect confidence in the source belief. However, certain types of appeals, such as high versus low fear, can influence receiver characteristics (i.e. anxiety), thus influencing the receiver's own beliefs.

A multitude of factors associated with the message can influence how an individual's beliefs can be altered. This discussion will review current research on message repetition, number and type of arguments and emotional tone. Early research on message repetition indicated that repeating a message could enhance attention, comprehension, and message

retention (Wilson 1968). However, more recent studies have revealed that often initial attention to a message is high, but after a certain number of repetitions, attention levels tend to decrease (Engel et al. 1986). People cease drawing the same meaning from a stimulus when it is seen or heard too often. Engel et al. refer to this phenomenon as **semantic satiation** or wear out.

Cacioppo and Petty (1979) found in their experiment on message repetition that message reception increased significantly with repetition. However, acceptance of the message varied according to the number of repetitions. Consistent with Engel and others (1986), results indicated a point of semantic satiation in which further belief change either did not occur or was negative. Initially attitudinal agreement increased, but as exposure continued, attitudinal agreement decreased. The point of satiation is dependent upon message and receiver characteristics, such as the complexity of the message, emotional content and receiver intelligence; therefore, the exact point of satiation varies among communications and receivers.

Another message attribute which may affect attitudes and behavior is the type and number of persuasive arguments incorporated into a persuasive message. Lawyers are well aware that the number of arguments, as well as the strength of these arguments, can determine the fate of their client. Though some research has indicated that the greater the number of arguments the more persuasive (Calder et al. 1974), other research has leaned to the opposite: more is not always better (Petty and Cacioppo 1981).

Similar to the repetition issue, as more arguments are presented satiation may occur. As similar arguments are introduced people may become bored or irritated. Additionally, information overload may occur. People have the ability to process only a limited amount of information at one period of time, so individuals may begin to tune out additional arguments. When providing a variety of argument statements, message producers must be cautious that weaker statements do not diminish the persuasive power of stronger statements. It would be best to expose audiences to strong persuasive statements only (Petty and Cacioppo 1981).

Additionally, the type of argument incorporated into a persuasive message can influence its success. For example, in a study of message arguments on breast self-examination, Meyerowitz and Chaiken (1987) determined that negatively framed arguments manifested more positive attitudes and behavior toward breast self-examination than positively framed arguments. A negatively framed argument stressed the negative consequences of not performing breast self-examination, while positive arguments stressed positive consequences. It is interesting to note that the impact of the negatively framed message was not attributed to fear arousal.

The effectiveness of fear arousing messages has been a constant source of debate in persuasive communication research. The original hypothesis in fear appeals research was that a message containing high fear arousing information will be more persuasive than a low fear arousing message. The hypothesis is largely based on the theory of cognitive dissonance. It is assumed that once fear or emotional tension is aroused, the audience will become motivated to accept the recommendations advocated by the communicator to reduce anxiety or dissonance.

Receiver Factors

Receiver variables influence the individual's confidence in his own belief. These factors include two types of

characteristics: relatively stable individual characteristics and situational or topic-related variables (Fishbein and Ajzen 1975). Individual characteristics consist of variables, such as general persuasibility, chronic anxiety, self-esteem, cognitive abilities, etc. Topic-related factors consist of variables, such as acute anxiety, involvement, uncertainty, pre-existing knowledge of the topic.

A constant source of frustration to the designers of persuasive communication programs is the extreme variability of audiences. Audiences rarely are cohesive in nature. Therefore, information program designers must identify as many specific characteristics of their audiences and tailor messages according to these characteristics in order to facilitate belief change. Planners must be sensitive that receiver characteristics which may facilitate the persuasion process for one communication, may detract from the effectiveness in another.

For example, the audience's cognitive responses are often more important in facilitating attitude and behavior change than message characteristics (Petty and Cacioppo 1981, Smith 1982). An understanding of specific audience characteristics should give communicators insight on the potential cognitive responses individuals may have for a particular message. Cacioppo and Petty (1986) determined that individuals who engage in extensive issue-relevant thinking (i.e. exert extensive cognitive processing) when forming or changing a belief tend to exhibit stronger attitude-behavior correspondence.

The discussion to this point has examined the process of how beliefs can be changed. The above review examined how source, message and receiver characteristics can be manipulated to affect changes in beliefs. However, most persuasive communication program designers are interested in overt behavioral changes. Did the desired behavior occur? Did the persuasive communication facilitate positive behavioral change? The following section summarizes the theory of reasoned action and explains the relationship between belief change and behavioral change.

Summary of Theory of Reasoned Action

To summarize the theory of reasoned action, Fishbein and Ajzen maintain that beliefs are the central role in their conceptual framework. Influence or persuasive attempts are directed at beliefs. If the persuasive attempt produced a change (either positive or negative) in primary beliefs, the authors assume that this change influences other dependent variables, such as attitudes, subjective norms, intentions and behavior (Figure 4). Attitudes are defined as a person's salient beliefs about a particular object. Subjective norms are individuals' beliefs that important others think they should or should not engage in a particular behavior. By directing persuasive communications at an individuals' beliefs about an object or behavior **and** beliefs about important individuals' expectations, a communicator can influence and alter behavioral intentions and actual behavior. The theory of reasoned action provides a means for determining how communicators can influence individuals' beliefs, thus indirectly affecting behavior.

Behavioral - Based Persuasion

Behavioral-based persuasion differs greatly from message-based persuasion. The process involves, first, having communicators attempt to get audience targets to engage in some behavior. It is assumed that if targets engage in the desired behavior, then attitude formation or change will occur. The attitude change should be based upon positive experiences with the object or behavior.

Therefore, in behavioral-based persuasion, behavior precedes attitudes (**B ---> A**). In essence, behavior serves as the important sources of information from which attitudes (both positive and negative) can be created or altered. Similar to message-based persuasion, once an attitude is formed or modified, it is assumed that the new attitude will guide behavior (i.e. $\mathbf{B_1}$ **---> A --->** $\mathbf{B_2}$). This process of behavioral change gives behavioral compliance seekers a dual task. First, the compliance seeker must induce the target individuals to engage in the behavior. And secondly, the compliance seeker must attempt to create or alter attitudes through the target's engagement in the initial behavior.

Many social-psychological theories exist which suggest various methods by which information programs can induce trial behavior. Cialdini (1988) discusses several methods based on social-psychological theory for changing individuals' behavior in anticipation of forming or modifying individuals' attitudes. These strategies, which are covert in nature, can be employed to elicit behaviors that might otherwise not be performed. Cialdini describes how influence strategies can take advantage of people's various needs, such as the need to be liked, the need to reciprocate favors, and the need to be consistent in behavior. Compliance seekers can manipulate situations such that individuals attempt to satisfy these needs. When individuals attempt to satisfy their needs in a manipulated situation, they are very likely to unknowingly comply with the behaviors described by the compliance seeker. The following review examines several of the persuasive strategies.

Automatic Behavioral Responses

Cialdini (1988) argues that humans have automatic behavioral patterns. These automatic behavioral responses are frequently based upon heuristic rules. Heuristics are basically rules of thumb which individuals rely upon to make quick decisions. Though these rules are often reasonable guides for making decisions, the use of heuristics can make individuals terribly vulnerable to influence, especially if compliance seekers have a strong understanding of how and why these automatic patterns operate. Individuals have fixed-action patterns or "click-whirr" responses to certain stimuli that occur in virtually the same manner and order every time. For example, individuals seeing a 50% off everything sign in a mall store are very likely to enter the store to see what is on sale even though they may not need any of the products the store offers. As a society we have been conditioned to automatically respond to sale signs in stores. Responding automatically to stimuli allows people the luxury of not having to analyze carefully how they should behave in every situation.

Though these automatic behavioral patterns ease people's daily cognitive demands, automatic responses have several disadvantages. First, an individual may make costly mistakes by responding automatically. If individuals exert minimal or no cognitive activity in behavioral decision-making, the potential for behavioral blunders is quite great. A second disadvantage is that some compliance seekers can take advantage of these automatic behavioral responses by manipulating situations such that target individuals engage in behaviors that may not be in their best interest.

Though disadvantages are inherent in these automatic responses, compliance seekers can manipulate situations and settings to evoke behavioral responses that are in the best interest of the target group. For example, wilderness managers manipulate backcountry campsites in occupied grizzly bear habitat by providing food storage facilities. These facilities are

located at least 100 yards away from tent areas to prevent grizzly bears which may be attracted to food odors from entering a sleeping area. By using the food storage facilities backcountry visitors reduce the risk of encountering a bear while they are sleeping. It is in their best interest to use these facilities. Approximately 90% of backcountry visitors to Glacier National Park use the food storage facilities (Braithwaite and McCool 1989). Managers have manipulated backcountry users' behavior by providing food storage facilities.

Additional examples of heuristics or automatic behavioral responses are authority, reciprocity, and liking rules. People often tend to follow the advice of authority figures, such as parents, doctors, teachers, law enforcement agents, etc. These authority figures usually give good advice, thus individuals tend to tend to comply with the requests of authority figures. At a very early age humans are taught to obey the requests of authorities. As individuals become socialized to believe that authorities possess high levels of knowledge, wisdom, and power, obedience becomes somewhat automatic. However, Milgram (1974) indicated that blind obedience to authority figures may result in very negative consequences (i.e. potential to inflict high voltage shock on experimental subject). Advertisers have successfully used authority figures. Actors that portray TV doctors (i.e. Robert Young) have been successfully utilized in advertisements in order to get consumers to purchase various pharmaceutical products.

Another widely accepted heuristic of human society is the rule of reciprocity. Basically, the rule of reciprocity states that a person receiving a favor, gift or invitation from another individual is obligated to repay the provider of the gift. Receiving a favor can create a feeling of indebtedness within the recipient. To reduce feelings of uneasiness associated with being in debt, a recipient is likely to return the favor as soon as possible. Marketers have been very successful in gaining behavioral compliance by implementing the rule of reciprocity. Often salespersons will offer "free samples" to potential customers. The "free sample" tends to obligate the customer to feel the need to return the favor by purchasing the product.

Lastly, individuals are more likely to comply with the requests of individuals they know and like than individuals they don't particularly like. To gain compliance, social influence practitioners tend to emphasize specific features about themselves to increase their overall attractiveness. Attractive people tend to be more persuasive than individuals perceived to be less attractive. College students exposed to advertisements for razor blades had more positive attitudes for the product when the product was endorsed by an attractive individual than an unattractive individual (Petty, Cacioppo, and Schumann 1983). Additionally, Chaiken (1980) examined how college students responded to a new campus rule when an attractive source presented one strong argument in favor of the rule versus and unattractive source who presented five strong arguments in favor of the rule. Students who perceived the rule to be of low relevance were more persuaded by the attractive source than the unattractive source.

Summary

This section has summarized the conceptual framework regarding the relationship between persuasion, attitudes and behavior. Persuasion is a commonly used method for influencing people's behavior. The above discussion has identified two persuasion strategies: message-based and behavioral-based. The message-based approach focuses on

changing individuals' attitudes via a persuasive message in order to induce a behavioral change. The behavioral-based model focuses on initiating individuals' engagement in a behavior as a means for influencing attitudes. As attitudes are changed by the individual either having a positive or negative experience with the behavior, future behavior should reflect the attitude change. For example, behavioral situations which involve individuals who are highly motivated (i.e. great personal relevance) to carefully examine and evaluate a communication, a message-based approach may be the most effective for inducing behavioral change. On the other hand, situations that are characterized by low motivation levels, behavioral-based persuasion may be the most effective.

Other factors, such as knowledge, experience levels and pre-existing attitudes, can also influence the effectiveness of these two persuasion strategies. The previously discussed theoretical framework will guide the testing of several hypotheses. The hypotheses will examine how these two approaches can be applied in order to persuade backcountry visitors to engage in appropriate behavior in occupied grizzly bear habitat.

Study Hypotheses

This section identifies the specific hypotheses that will guide the inquiry about the most effective persuasive communication approaches for altering inappropriate backcountry behavior. The following hypotheses will focus the research to answer specific questions about information program effectiveness.

> ***Objective One:*** *Identify the types of persuasive communication messages recreationists prefer and tend to expose themselves to, as well as identify the types of messages individuals feel are the most influential in altering their beliefs about engaging in a particular behavior.*

The purpose of this objective is to identify the types of persuasive messages potential visitors most prefer. The identification of the most preferred messages will direct the field research which will address Objectives 2 - 6. Since, this objective is primarily a pretest (i.e. identifies the types of messages to be examined in a field setting), no specific hypotheses will be tested.

To determine the types of messages to test in the field eleven persuasive messages containing different appeal types were exposed to approximately 100 university students in 1989. The appeal types were a high fear, low fear, one-sided, two-sided, ecologistic, moralistic, evidence, rational, humorous, emotional and a currently used U.S. Park Service message. These various messages were exposed to students to determine the extent to which each message captured the specific appeal type. A semantic differential technique assessed students' attitudes towards the specific messsages. Reliability alpha scores ranged from 0.69 to 0.86 indicating that for the most part messages captured the intended domain.

The results of the 1989 analysis directed the investigation of the extent to which these messages may influence backpackers to engage in recommended behaviors. Four of the original eleven messages were eliminated to reduce the length of the questionnaire. An examination of reliability and mean scores for each message directed the elimination process. The seven remaining messages (one-sided, two-sided, emotional, ecologistic, humorous, high fear, and a currently used Park Service message) were again exposed to approximately 100 university students.

In addition to evaluating the extent to which each message captured the specific appeal type, students evaluated the extent to which they perceived the message would influence their behavior. Messages containing extreme emotional content were perceived to be the most influential on behavior. The high fear, emotional and two-sided messages were perceived as being the most influential messages. The humorous and Park Service messages were evaluated as the least likely to influence behavior.

This study was replicated again using approximately 60 university students. Results indicated that the high fear message was perceived again as being the most influential message. The ecologicistic message was perceived as being slightly less influential than the high fear message. Lastly, in addition to the seven messages, students were exposed to a new message which stressed the ease of engaging in appropriate behavior. The message was perceived to be somewhat influential of behavior though not as influential as the high fear and ecologistic messages.

The results of this final pretest of specific messages directs the following objectives and hypotheses. From the results of the pretest, three different messages (high fear, ecologistic, and easy) were exposed to hikers and backpackers in Jewel Basin Hiking Area. Though the easy message was tested in one pretest exclusively, evidence from a previous study (McCool and Braithwaite 1988) indicates that backcountry users' perceptions of the ease or difficulty of engaging in appropriate behavior may influence the likelihood of practicing the behavior in the backcountry. Individuals who evaluate the appropriate behavior as easy to practice are more likely to engage in that behavior while in the backcountry. Therefore, the messages, high fear; ecologistic; and easy, will be examined in the field research.

Table 2. Appropriate Backpacking Behavior For Occupied Grizzly Bear Habitat.

1. Store food in trees.
2. Make noise on trail.
3. Camp or hike in large group (>5).
4. Wear or use bear bells.
5. Wash dishes after each meal.
6. Cook 300 feet away from campsite.
7. Cook fish/bacon for meals.*
8. Use odor restrictive containers.
9. Wear clean clothes while sleeping.
10. Cook downhill from sleeping area.
11. Camp away from animal or hiking trails.
12. Carry garbage out.
13. Hike after dark.*

*Stated in reverse order of appropriateness.

Objective Two: *Assess backcountry users' behavioral intentions, reported behavior, and actual behavior concerning the appropriate behaviors necessary for backpacking in occupied grizzly bear habitat.*

To test the effectiveness of various persuasive communication programs, it is necessary to assess backcountry visitors' behavioral intentions prior to their backpacking trip. McCool and Braithwaite (1988) examined thirteen specific behaviors in their study of backpackers' behavior in Glacier National Park and the Jewel Basin Hiking Area. These behaviors, listed in Table 2, commonly appear in literature explaining appropriate behaviors for hiking in occupied grizzly bear habitat.

To assess behavioral intentions and reported behavior, a randomly selected group of visitors to the Jewel Basin Hiking Area will be asked to indicate the extent to which they plan to or did practice the thirteen behaviors listed in Table 2. Actual backcountry behavior will be observed by field researchers as visitors hike, backpack and camp in Jewel Basin.

Fishbein and Ajzen's (1975) theory of reasoned action states that behavioral intentions are highly predictive of actual behavior. Therefore, behavioral intentions should be highly correlated with actual behavior. It is also assumed that reported behavior should be highly correlated with both behavioral intentions and actual behavior. Thus,

Hypothesis 1: The three behavior scores (intended, reported and observed) will be positively correlated with each other.

However, Fishbein and Ajzen (1975) caution that three major factors may influence the correlation between behavioral intentions and behavior. First, a higher correlation would be expected if behavioral intentions and behavior have similar levels of specificity. A strong positive correlation between behavioral intentions and behavior should exist when the behavior of interest, the target engaging in the behavior, the situation in which the behavior will occur and the time when the target behavior should occur are all very specific. The behaviors listed in Table 2 are all quite specific (i.e. make noise on trail). The target groups are specific to those groups visiting Jewel Basin. The situation is specific to hiking, backpacking and camping in Jewel Basin. The time is specific to the target's next trip in Jewel Basin.

The second factor that Fishbein and Ajzen warn may influence the correlation between intentions and behavior is the stability of the intention. Over time individuals may change their behavioral intentions (i.e. have unstable intentions). As the time period between the measurement of intentions and the observation of behavior increases, the weaker the correlation between intentions and behavior. The time period between measuring behavioral intentions and actual behavior in this study should be less than 24 hours. Therefore, a strong positive correlation should exist between intentions and behavior.

The third factor is the degree to which individuals can engage in the behavior completely under their own volition. Intentions may not be carried out if a person does not possess the necessary abilities or resources to engage in the behavior. The extent to which volitional control may influence the correlation between behavioral intentions and behavior will be examined more closely in Objective Three.

Objective Three: *Determine the effects various written messages explaining the proper procedures for backpacking in grizzly bear habitat*

may have on individuals' backcountry behavior.

Land management agencies frequently rely on written materials (brochures, signs, etc.) to inform, educate, and persuade backcountry users to engage in appropriate behavior while in backpacking in grizzly country. The basic goal of these communication programs is to alter attitudes, beliefs and/or behavior. It is assumed that once individuals receive information, they will accept the information, adjust their attitudes accordingly, and engage in appropriate behavior. Thus,

Hypothesis 2: Behavioral compliance will be significantly greater for those backcountry visitors receiving a written message than those visitors who do not receive a written message.

An analysis of the brochures and written material from various agencies that manage grizzly habitat indicated that most of the text consisted of information on the biology, ecology and behavior of bears (Braithwaite and McCool 1992). Much less space and text was devoted to appropriate behavior for grizzly country than characteristics of the bear. Often messages concerning appropriate behaviors were interspersed with other information (i.e. rules and regulations, low impact camping, hypothermia). The strength of messages pertaining to appropriate behaviors may be tempered by surrounding text. A brochure containing only information about appropriate behavior may reduce the potential of one message to override another message. Most of the information distributed by agencies is written fairly objectively. No agency included messages with strong negative undertones or high fear arousal. For the most part, the grizzly bear is portrayed in the literature as a natural component of the wilderness or backcountry ecosystem to which humans are merely visitors.

Various appeal types, such as a high fear appeal or an ecologically-based appeal, may vary in degree of effectiveness in influencing backcountry behavior. This study objective examines the extent to which written messages containing different appeal types influence behavior. As state earlier, three appeal types will be examined: a high fear appeal, an ecologically oriented appeal, and an appeal stressing how easy it is to practice proper backcountry techniques. As Hypothesis 2 indicated, it is suspected that all three messages should influence behavior.

Hypothesis 3: Behavioral compliance will be significantly greater for visitors receiving a high fear message than visitors receiving the easy message.

Backcountry users' beliefs and attitudes toward the grizzly bear may significantly effect the degree to which individuals practice appropriate behavior. McCool and Braithwaite (1989) found in their study that individuals possessing ecologistic beliefs (e.g. viewing grizzly bears as essential components of a naturally functioning ecosystem) are more likely to engage in appropriate behavior than individuals possessing negativistic beliefs (e.g. believing bears are dangerous and cruel and should be eliminated). Additionally, backpackers to the Jewel Basin Hiking Area tended to exhibit stronger negativistic beliefs than backpackers to Glacier National Park. This suggests that sensitizing backcountry users to an ecologically oriented way of viewing the bear through persuasive communication may increase behavioral compliance. Lastly, these findings suggest ecologically oriented messages may be more effective for gaining behavioral compliance than high fear messages. The

fear and emotional arousal associated with high fear messages may create negativistic beliefs in backcountry visitors, thus resulting in reduced behavioral compliance. Therefore,

> *Hypothesis 4: Behavioral compliance will be significantly greater for backcountry visitors receiving an ecologically oriented message than visitors receiving a high fear message.*

> ***Objective Four:*** *Determine the effects various behavioral-based persuasion strategies may have on individuals' backcountry behavior.*

In addition to written messages, land management agencies also persuade individuals through behavior-based persuasion. This approach focuses upon eliciting a desired behavior in an individual through environmental manipulation. This approach is very direct. Rather than indirectly teaching new behaviors through information, the manager alters people's behavior by changing the environment within which the behavior occurs. For example, a manager can reduce the number of people walking across an alpine meadow by routing the trail around the meadow on less fragile terrain. The location of the trail can manipulate where individuals will most likely decide to walk.

Differences in participation in appropriate behaviors (i.e. storing food properly, cooking away from campsites, camping away from hiking and animal trails) were statistically significant ($p < 0.05$) between backpackers in Glacier National Park and the Jewel Basin Hiking Area. Jewel Basin has no facilities in the backcountry. For example, 96% of the backpackers to Glacier National Park reported they always or usually stored their food in trees. Only 75% of the backpackers to Jewel Basin reported they always or usually stored their food in trees. Eighty-eight percent of the Glacier National Park backpackers reportedly always or usually cooked 300 feet away from their campsite, while only 27% of the backpackers to Jewel Basin Hiking Area reported cooking 300 feet away from their campsite. This suggests environmental manipulation or behavior-based persuasion may increase compliance in appropriate behavior in the Jewel Basin Hiking Area.

As described earlier, the rule of reciprocity is a widely accepted norm in human society. If managers give backpacking groups a gift of a certain type of equipment necessary for grizzly country, such as a bear bell or rope to hang food, the group may agree to use the gift to engage in proper behavior as a means of repaying the manager. Visitors possessing the necessary equipment to engage in appropriate behavior are more likely to practice appropriate behavior (McCool and Braithwaite 1988). To determine if the rule of reciprocity can effectively elicit behavioral compliance the following hypotheses will be tested.

> *Hypothesis 5: Significant differences in noise making behaviors will exist between backpacking visitors who receive bear bells at the trailhead and visitors who do not receive bear bells at the trailhead.*

> *Hypothesis 6: Significant differences in food storage compliance will exist between backpacking visitors who receive rope to hang their food while camping in the backcountry and visitors who did not receive rope at the trailhead.*

> ***Objective Five:*** *Assess visitors' knowledge about bears, attitudes toward bears and attitudes toward appropriate behavior. Differences in*

these factors may explain the effectiveness of various persuasive communication strategies.

Fishbein and Ajzen (1975) detail how knowledge (primary beliefs) are associated with behavioral intentions (the immediate precursor to behavior). Therefore, knowledge about appropriate behavior, consequences of appropriate behavior, and knowledge about bears should all be associated with behavioral intentions. Additionally, external beliefs can indirectly influence behavioral intentions. External beliefs are those beliefs which affect primary beliefs, thus having an indirect affect on actual behavior. An individual's attitude toward grizzly bears may influence indirectly the extent to which an individual may practice appropriate behavior. Four external beliefs, based on Kellert's (1978,1985) study of attitudes toward animals, were examined in this study. The four external beliefs assessed are:

1. Ecologistic beliefs -- beliefs about the interrelationships characteristic of natural systems and the place of the grizzly bear within that system. Individuals holding ecologistic beliefs would be expected to have a greater appreciation of the role of the grizzly bear in backcountry areas and a greater sensitivity to human influences on it.

2. Naturalistic beliefs -- beliefs based on an interest in and affection for wildlife and the outdoors. These differ from ecologistic beliefs in that appreciation of wildlife as an object rather than as its place in the system is of the primary orientation. Never the less, individuals holding naturalistic beliefs would be expected to be sensitive to human influence on grizzly bears.

3. Moralistic beliefs -- beliefs concerned with the right and wrong treatment of animals, with strong opposition to exploitation and cruelty toward animals.

4. Negativistic beliefs -- beliefs indicate a primary orientation toward an active avoidance of animals due either to fear or dislike. Individuals holding negativistic beliefs toward grizzly bears would be expected to seek situations where grizzly bears were unlikely to be encountered.

Since, external beliefs can indirectly affect primary beliefs:

Hypothesis 7: Ecologistic, naturalistic and moralistic beliefs are all positively correlated with knowledge about appropriate behavior, the consequences of appropriate behavior, and knowledge about bears.

Fishbein and Ajzen (1975) state that message factors can influence receivers' confidence with their primary beliefs. Message characteristics can also influence receivers' confidence in external beliefs. Individuals holding ecologistic attitudes towards grizzly bears may be more receptive to an ecologistic message which may provide greater confidence in individuals existing external beliefs. The greater the strength of external beliefs, the more likely these beliefs may affect primary beliefs, thus indirectly influencing behavior. Therefore:

Hypothesis 8: Adoption rates for individuals exposed to the written ecologistic message will be greatest for individuals with an ecologistic attitude.

Hypothesis 9: Adoption rates for individuals exposed to the written high fear message will be greatest for individuals with a negativistic attitude.

Hypothesis 10: Adoption rates for individuals exposed to the written

message stressing the ease of appropriate behavior will be greatest for individuals who rated appropriate behaviors as easy to practice.

Objective Six: *Identify which persuasion strategy (a message-based persuasion strategy, a behavioral-based persuasion strategy or combination of two strategies) is the most likely to result in backcountry users behavioral change.*

In addition to the message-based and behavior-based approaches to persuasion, managers can also use a combinatory approach to persuasion. A combinatory approach to persuasion involves exposing individuals to both a message-based persuasion strategy and a behavioral-based strategy. Exposing individuals to two forms of persuasion should result in greater behavioral compliance. In order for behavioral change to occur via the message-based approach, the persuasive message must stimulate belief or attitude change. If change is not stimulated, behavior change will most likely not occur and the persuasive attempt would be deemed ineffective. This approach is not likely to be very effective for individuals who do not possess the motivation or ability to process the written message (Petty and Cacioppo 1986a). A behavioral-based approach to persuasion may be the more effective persuasion strategy for these individuals.

The message-based approach may be most effective for those individuals who are highly motivated to cognitively process new information, have the ability to do so, and find the message topic to be of personal relevance. The cognitive processing of or elaborating on new information should result in new beliefs or changes in existing attitudes. To behave consistently with new or altered attitudes, individuals will most likely adjust their behavior. Since these individuals' needs for cognition are usually quite high (Petty and Cacioppo 1986b), they may be less inclined to engage in automatic behavioral responses (Cialdini 1988). Thus, individuals high in need for cognition may be less susceptible to influence or persuasion via the behavioral approach than individuals having a low need for cognition.

Since backpackers vary in many characteristics (i.e. demographics, experience levels, education, knowledge, cognitive abilities), it is difficult to determine which persuasive strategy would be the most effective without an extensive evaluation of every backpacking group. Therefore, exposing the entire target audience to several different persuasive strategies (both a message and behavioral based approach) should increase the probability of behavioral compliance. Thus,

Hypothesis 11: Significant differences in behavioral compliance rates will exist between backcountry visitors who receive a combination approach (both a written message and a behavior-based strategy) and visitors who receive only a written message, behavioral-based strategy or no persuasion strategy.

METHODOLOGY

Study Area

The study area is the Jewel Basin Hiking Area located northeast of Bigfork, Montana. Jewel Basin is administered by the Flathead National Forest with the Hungry Horse Ranger District being responsible for managing the area. Jewel Basin, located at the north end of the Swan Mountain Range, consists of 15,349 acres of high mountains and lakes. The Basin includes 27 alpine lakes, many mountain streams, meadows, rocky peaks and a multitude of wildlife. The lakes contain several species of fish including cutthroat and rainbow trout. Wildflowers bloom during the middle to late summer. Common flora to the area are beargrass, Indian paintbrush, and glacier lillies. Tree species include Engelmann spruce, subalpine fir, Douglas-fir, western larch, white pine, lodgepole pine, and whitebark pine. The area is also home to many species of wildlife including mountain goats, whitetail and mule deer, elk, black and grizzly bears, mountain lion, bobcat, wolverine, coyote, marmot, porcupine, ground squirrels and many birds (US Forest Service 1984).

Approximately 35 miles of trail wind throughout hiking area connecting many of the lakes. Elevations within the Basin range from 4240 feet on Graves Creek to 7542 feet on Big Hawk Mountain. Since the area has been specifically designated a hiking area, the Basin is closed to motorized equipment and horse pack stock. The Basin had approximately 200 backcountry campers and 1000 day hikers during the seven weekends from July 18 to August 30, 198 (Braithwaite 1989). Much of the use in the Basin originates from the Camp Misery Trailhead located 10 miles east of Bigfork, Montana (US Forest Service, unpublished data).

Jewel Basin is an ideal location for examining the effects of various influence strategies on backcountry behavior. Currently, visitors to Jewel Basin receive no on-site information concerning appropriate behavior for travelling in occupied grizzly bear habitat. Backcountry rangers do patrol Jewel Basin, so visitors may receive verbal information from rangers while in the backcountry. Backcountry users can purchase a brochure entitled *Jewel Basin Hiking Area* at various Forest Service ranger stations and offices throughout the Flathead Valley. However, the brochure contains no information on appropriate behavior for grizzly country. The brochure does alert backcountry users that the area is "bear country" and states that "bears are unpredictable and in certain circumstances can be dangerous." The brochure directs visitors to seek additional information on how to camp in bear habitat from any of the ranger stations or offices located in the Flathead area.

The area is classified as having a relatively low objective probability of encountering a grizzly bear. Of 30 bears radio collared in the South Fork Study Area (817 km^2), 8 bears entered the Jewel Basin Hiking Area in 1990. One female grizzly is known to den in the Basin and has raised 3-4 offspring, who spend 70 to 80 percent of their time in the Basin (Manley 1991). Documentation of grizzly bear movement indicates that bears in the Basin tend to move to less used areas during high recreation use times.

Study Population

The population of interest in this study is day hikers and backpackers to the Jewel Basin Hiking Area. Since it was impractical and uneconomical to contact all backcountry visitors, a sample of the population was exposed to the various experimental conditions. A limitation in contacting all visitors to the Basin is that the area can be accessed by nine trails. Given that most visitors access the Basin via the Camp Misery Trailhead, experimental manipulation occurred at this site prior to visitors entering the Basin. Additionally, a restriction was placed on the age of visitors exposed to experimental manipulations. To insure that visitors had the ability to respond to an experimental manipulation, subjects were restricted to those visitors who were 16 years and older. Lastly, since the snowpack in the Basin often remains through mid-July and backcountry use is highest during the summer months, the study population was restricted to those individuals using the Basin during the period of July 13 to September 2, 1991.

Experimental Treatments

Though a dozen or more behaviors are advocated by land management agencies for safety while backpacking in grizzly habitat, only two specific behaviors were to be examined in this study. The first behavior of interest was the extent to which visitors made noise while hiking in Jewel Basin. The 1987 study of backpacker behavior in Jewel Basin indicated that 80 percent of those backpackers surveyed stated that they "always" or "usually" made noise on the trail while hiking. However, only 16 percent stated they "always" or "usually" used bear bells as a means of making noise. Compliance with this recommended behavior might be increased by providing backpackers with bear bells. The 1987 study examined backpackers' behavior exclusively. In addition to backpacker behavior, the following study will examine the noise making behavior of day hikers.

The second behavior of interest was the extent to which backpackers hung their food while camping in Jewel Basin. The 1987 study indicated that 74 percent of backpackers hung their food and 54 percent used odor proof containters while in the backcountry. Providing backpackers with rope or odor proof containers should increase compliance with food storage behaviors.

During the 1991 field season visitors to the Jewel Basin Hiking Area were exposed to a variety of message-based and behavioral-based persuasive communication strategies advocating these two behaviors (making noise and proper food storage). The message-based persuasion strategies consisted of three different written messages:

1. a high fear message advocating the proper behavior,
2. an ecologically oriented message explaining the role of the grizzly bear in the Jewel Basin ecosystem and advocating a proper behavior,
3. a message which stresses how easy it is to engage in the proper behaviors.

Each individual visiting Jewel Basin was given one of the three written messages upon arrival at the Camp Misery Trailhead.

The behavioral-based strategy is based on a social-psychological rule of reciprocity. Selected visitors to Jewel Basin were given bear bells or ropes for hanging their food.

In addition to the message-based and behavioral-based persuasion approaches, a combination approach was also exposed to Jewel Basin visitors. Some visitors received a combination of a message (i.e. high fear, ecological, or easy) with a behavioral manipulation (i.e. rope or bear bell).

Backcountry behavior, the dependent variable, was examined to determine the extent to which backpackers engage in the behaviors recommended by compliance seekers (i.e. land management agencies). The type of persuasive communication stratey, the independent variable, was manipulated in the following experimental treatments: (1) exposure to a high fear message; (2) exposure to a ecologically oriented message; (3) exposure to a message stressing the easiness of proper behavior; (4) receiving a gift of a bear bell or a rope for hanging food; (5) exposure to a high fear message and receiving a bell or rope; (6) exposure to a ecologically oriented message and receiving a bell or a rope; and (7) exposure to a message stressing the easiness of engaging in proper behavior and receiving a bell or rope.

Experimental Design

A posttest-only control group research design (Campbell 1957) was employed to investigate the effectiveness of the treatments mentioned in the previous section. The posttest design can be illustrated as follows:

A X O_1
(Experimental Group)

A O_2
(Control Group)

A indicates that subjects have been randomly assigned to either an experimental group or a control group. *X* indicates that individuals randomly assigned to this group were exposed to an experimental treatment (i.e. persuasive communication strategy). O_1 is the posttest measurement of the dependent variable. In this experiment, the posttest measured individuals' reported and actual behavior while hiking or backpacking in Jewel Basin.

The control group illustrated above is of great importance in the posttest only experimental design. To ensure internal validity, it is necessary to have a no-treatment control group. Random allocation and control should drastically reduce the effects of extraneous variables.

Randomly assigning subjects to either the experimental group or control group assures that at time *A*, groups are equal and have similar characteristics, even if these characteristics are not measured. Campbell (1957) states that though equality can be assured by exposing subjects to a pretest, equality can also be assured by the random assignment of subjects to treatment and control groups. The posttest-only design controls for the effects of pretest sensitization. Exposure to pretests can potentially effect posttest measurements.

To test for sensitization effects in this experiment, one randomly assigned group completed a pretest, but received no experimental treatment. The pretest measured visitors behavioral intentions concerning appropriate behavior prior to entering Jewel Basin. The self-reported and actual behavior of these subjects was also assessed. The self-reported and actual behavior of this group was then compared directly with the control group receiving no treatment or pretest. Differences in behavior might be attributed to exposure to a pretest.

The primary variable of importance in this study is actual behavior in occupied grizzly bear habitat. Though it would be ideal to examine the effects of experimental treatments with a pre and post measurement of behavior, the effects of sensitization could severely affect experimental results. The Solomon Four-Group Design (Solomon 1949) is frequently used to control sensitization effects. However, the implementation of this design into this experiment would result in a complex design of 16 specific treatments,

significantly reducing the sample size for each treatment. The posttest-only design provides a fairly simple experimental design for testing the effects of several experimental treatments while controlling for sensitization. A detailed illustration of the experimental design is provided in Appendix A.

Sampling Plan

The experimental treatments were tested in the Jewel Basin Hiking Area by two researchers during the summer backpacking season of 1991. One researcher exposed each Jewel Basin visitor to one of the persuasive communication strategies as they arrived at the Camp Misery Trailhead. The other researcher observed and evaluated individual and group behavior as it pertains to the appropriate behavior advocated (i.e making noise). Since day hikers did not camp in the backcountry, only noise making behavior was evaluated. Initially the research intended to evaluate both the food storage and noise making behavior of backpackers. However, during a practice sampling period and the first weekend of sampling, the researchers determined that observing food storage behavior was extremely difficult.

Since the snowpack in the Basin often remains through mid-July and the backcountry use is highest during the summer months, the study was conducted for 7 weeks beginning Friday, July 12th and end Monday, September 2nd. Additionally, since the majority of visitor use in the Jewel Basin occurs during weekends, experimental treatments were only administered Friday afternoons through Sunday afternoon. Originally, the study had planned to be conducted for 8 weeks during the summer. However, adverse publicity concerning the study appeared in the local papers of western Montana during the first week of August. To temper any potential bias that may have occurred from visitors' exposure to this publicity, sampling was cancelled during the weekend of August 16 - 18.

Nine two-hour sampling periods occurre each weekend. The sampling periods were Friday 1-3 pm, 3:30-5:30pm; Saturday 8-10am, 10:30am-12:30pm, 1-3pm, 3:30-5:30pm; Sunday 8-10am, 10:30am-12:30pm, 1-3pm. On the last weekend of sampling (Labor Day weekend) Sunday afternoon sampling continued from 3:30 -5:30pm and Monday morning and afternoon (8-10am, 10:30am-12:30pm, 1-3pm).

Treatments were randomly selected for various time periods. Each of the seven treatments and two controls were tested during each weekend. One treatment was randomly selected for each time period over the course of the weekend. Treatments were exposed to backcountry groups in the Jewel Basin Hiking Area according to the schedule outlined in Appendix B.

Study Procedures

Day hikers and backpackers were approached by a University of Montana researcher as they prepared to hike up the main trailhead (Trail #8) at the Camp Misery parking lot. The researcher explained that the University was conducting a study of backcountry use in Jewel Basin. The researcher asked for the cooperation of the users and requested their names and addresses in order to mail them a posttest questionnaire. After the visitors agreed to cooperate and offered their names and addresses, the researcher exposed the individuals to one of the following treatments.

Treatment 1. Depending upon the type of user group (day hiker vs. backpacker), the following written high fear message was given to all individuals in each group.

If day hikers:

Hiking and camping in grizzly country can be dangerous. Brett Simmons will never be able to describe exactly how dangerous it is. He was killed by a grizzly bear while sleeping in his tent. The grizzly then dragged him over 50 feet from his campsite. People have been killed or seriously injured by surprise encounters with bears. Approximately two people per year are killed or mauled by grizzly bears.

You are at risk of injury if you fail to follow appropriate camping and hiking techniques in bear country. While hiking or camping in grizzly country be aware of the risks involved as well as how to lower the potential for conflict. The U.S. Forest Service recommends that you be alert for bears and bear activity when hiking in bear country. Be especially alert in areas with fresh tracks and droppings and near berry patches and other food sources. Large areas of disturbed vegetation and freshly turned soil are often indicators of bear presence.

To reduce the risk of an encounter make a lot of noise when travelling. Hikers should wear bear bells, carry and shake a tin can with a rock in it, sing or talk loudly when hiking. Natural conditions, such as wind, thick brush or rushing water can muffle human voices, bells or cans. Therefore, it is extremely important to make as much noise as possible when hiking on a windy day or in an area with thick brush and rushing water. Also, when approaching a switchback or a curve in the trail that you cannot see around make as much noise as possible. Remember, making noise on the trail reduces the risk of an encounter with a bear. Lastly, hiking alone presents a greater risk than travelling with a group. Groups of 4-6 persons are recommended.

If backpackers, the same message was used but the following was added:

The U.S. Forest Service also recommends that you prepare and store your food properly when camping in grizzly country. They recommend:

1. Prepare your food away from and downwind from the sleeping area.
2. Cook food 100 yards from the sleeping area.
3. Avoid cooking strong smelling foods such as bacon, etc. Freeze dried, canned and tightly packaged foods are best.
4. Keep a clean camp at all times. Wash dishes and containers after every meal.
5. Never store food of any type in a tent.

6. Sleep in clean clothes free from cooking odors.
7. When not cooking or eating place all food and garbage in a seald plastic bag to reduce odors and hang it between two trees at least 100 yards from the sleeping area. The food should be hung at least 12 feet above the ground and at least 4 feet from the stems of the trees.

Cooking and storing your food properly should limit food odors in your campsite and reduce the risk of a bear entering your campsite at night.

Individuals were asked to read the message. If they didn't have any questions concerning the message, the individuals were free to hike into the backcountry. A second University of Montana researcher inconspicuously observed the noise behavior of the group as they hike up Trail #8. This researcher was located off the trail and observed the group's behavior as they approached a large curve in the trail. The researcher recorded a physical description of the group, the noise level of the group indicated from a decibel meter, the base level of the decibel meter prior to group noise, the type of noise the group made (i.e. bells, cans, whistle, singing) and the wind conditions at the time of the observation. The researcher was located between the trailhead of Trail #8 and the junction of Trails #8 and #68.

Due to the adverse publicity which occurred the first week of August and some agency concern, this message was tempered slightly. From the weekend of August 9 - 11 to the end of the sampling period, a slightly different version of the high fear message was exposed to Jewel Basin visitors. The following changes were made in the high fear message:

Hiking and camping in grizzly country can be dangerous. People have been killed or seriously injured by surprise encounters with bears. Approximately two people per year are killed or mauled by grizzly bears.
You are at risk of injury if you fail to follow appropriate camping and hiking techniques in bear country. While hiking or camping in grizzly country be aware of the risks involved as well as how to lower the potential for conflict. The U.S. Forest Service recommends that you be alert for bears and bear activity when hiking in bear country. Be especially alert in areas with fresh tracks and droppings and near berry patches and other food sources. Large areas of disturbed vegetation and freshly turned soil are often indicators of bear presence.
To reduce the risk of an encounter make a lot of noise when travelling. Hikers should wear bear bells, carry and shake a tin can with a rock in it, sing or talk loudly when hiking. Natural conditions, such as wind, thick brush or rushing water can muffle human voices, bells or cans. Therefore, it is extremely important to make as much noise as possible when hiking on a windy day or in an area with thick brush and rushing water. Also, when approaching a switchback or a curve in the trail that you cannot see around make as much noise as possible. Remember, making noise on the trail reduces the risk of an encounter with a bear. Lastly, hiking alone presents a greater risk than travelling with a group.

Groups of 4-6 persons are recommended.

Treatment 2. This treatment was conducted exactly the same as Treatment 1, except the message delivered to the backcountry visitors was a written ecologically oriented message. The following message was delivered to day hikers:

> The grizzly bear is an essential component of the Northern Continental Divide Ecosystem. The grizzly bear's size and large appetite would place it at the head of the food chain. Therefore, disturbances to the grizzly bear population can affect all other plant and animal populations within that food chain. By engaging in several simple behaviors, backcountry users can help preserve the grizzly's habitat and minimize impacts upon the grizzly bear.
>
> The U.S. Forest Service recommends that you be alert for bears and bear activity when hiking in bear country. Be especially alert in areas with fresh tracks an droppings nd near berry patches and other food sources. Large areas of disturbed vegetation and freshly turned soil are often indicators of bear presence. Additionally, the U.S. Forest Service recommends that you make a lot of noise while hiking to avoid a surprise encounter with a bear. The less frequently grizzly bears come into contact with humans the more likely they will live undisturbed in their natural environment.
>
> To prevent encounters with grizzly bears, hikers should wear bear bells, carry and shake a tin can with a rock in it, sing or talk loudly when hiking. Natural conditions, such as wind, thick brush or rushing water can muffle human voices, bells, or cans. Therefore, it is extremely important to make as much noise as possible when hiking on a windy day or in an area with thick brush and rushing water. Also, when approaching a switchback or a curve in the trail that you cannot see around make as much noise as possible. Remember, making noise on the trail reduces the risk of an encounter with a bear. Lastly, hiking alone presents a greater risk than travelling with a group. Groups of 4-6 persons are recommended.

Backpackers also had the following added on to the above message:

> The U.S. Forest Service also recommends that you prepare and store your food properly when camping in grizzly country. They recommend:
>
> 1. Prepare your food away from and downwind from the sleeping area.
> 2. Cook food 100 yards from the sleeping area.
> 3. Avoid cooking strong smelling foods such as bacon, etc. Freeze dried, canned and tightly packaged foods are best.
> 4. Keep a clean camp at all times. Wash dishes and containers after every meal.
> 5. Never store food of any type in a tent.
> 6. Sleep in clean clothes free from cooking odors.
> 7. When not cooking or eating place all food and garbage in a seald plastic bag to reduce odors and hang it between two trees at

least 100 yards from the sleeping area. The food should be hung at least 12 feet above the ground and at least 4 feet from the stems of the trees.

If grizzly bears are not eating human food, they are forced to rely on natural foods, such as berries, roots and bulbs, small mammals and carrion. To help preserve the grizzly bear population, please store food properly while camping.

The observation of behavior occurred exactly the same as in Treatment 1.

Treatment 3. Again, Treatment 3 occurred in the same manner as the previous two treatments. The message for Treatment 3 was a written message stressing how easy it is for hikers and backpackers to make noise and hang their food properly. The following message was distributed to day hikers:

Hiking in grizzly country requires a little extra effort from backcountry visitors. The U.S. Forest Service recommends several simple activities for visitors to engage while hiking in grizzly country in order to reduce the likelihood of an encounter with a grizzly bear. These behaviors are all **very easy** to engage in. The U.S. Forest Service recommends that you be alert for bears and bear activity when hiking in bear country. Be especially alert in areas with fresh tracks and droppings and near berry patches and other food sources. Large areas of disturbed vegetation and freshly turned soil are often indicators of bear presence. Look for these signs when hiking in bear country. To reduce teh risk of encounters with bears make a lot of noise while hiking.

Think about how easy it is to make noise on the trail when hiking. Hikers can wear bear bells, cary and shake a tin can with a rock in it, sing or talk loudly when hiking. However be aware of natural conditions, such as wind, thick brush or rushing water which can muffle human voices, bells or cans. Therefore, it is extremely important to make as much noise as possible when hiking on a windy day or in an area with thick brush and rushing water. Also, when approaching a switchback or a curve in the trail that you cannot see around make as much noise as possible. Remember, being alert and making noise on the trail are easy behaviors to engage in while hiking on the trail. Not only is it easy to make noise on the trail, but making noise reduces the risk of an encounter with a bear.

Lastly, the Forest Service recommends that people not hike alone when in bear country. Hike with 4-6 persons when in bear country. If you are hiking alone or in a small group, find another lone hiker or small group and join them. Not only will you reduce the risk of an encounter with a bear, but you make even make a friend.

Backpackers also received the following message:

The U.S. Forest Service recommends that you prepare and store your food properly when camping in grizzly country. Though food preparation and storage requires a little extra effort from

backcountry users, the techniques are easy to practice. The Forest Service recommends that you:

1. Prepare your food away from and downwind from the sleeping area.
2. Cook food 100 yards from the sleeping area.
3. Avoid cooking strong smelling foods such as bacon, etc. Freeze dried, canned and tightly packaged foods are best.
4. Keep a clean camp at all times. Wash dishes and containers after every meal.
5. Never store food of any type in a tent.
6. Sleep in clean clothes free from cooking odors.
7. When not cooking or eating place all food and garbage in a seald plastic bag to reduce odors and hang it between two trees at least 100 yards from the sleeping area. The food should be hung at least 12 feet above the ground and at least 4 feet from the stems of the trees.

Think about how easy it is to hang food in trees while camping in the backcountry. Be sure to bring two ropes on your backpacking trip, this will help you store your food correctly. Though hanging food in trees may seem to appear difficult to do, it is really quite easy.

Again, observation of behavior was exactly the same as in Treatment 1.

Treatment 4. This treatment involved a behavioral manipulation without the use of a written persuasive message. In this treatment, a University of Montana researcher gave each backcountry user a bear bell to wear while hiking. The researcher simply stated: "Bear bells can be used as a means for making noise while hiking on the trail. Do you have bear bells with you today? (If, no.) Would you like to borrow some for your day hike?" The researcher then recorded whether or not the bells were borrowed. The second researcher observed noise making behavior as described in Treatment 1. In addition to the observations listed in Treatment 1, the researcher observed to what extent the group was using the bear bells and whether or not they were being used properly.

In addition to bear bells, backpackers were given 2 pieces of 25 foot length of rope. The researcher stated the following: "In order to store food correctly in the backcountry it is necessary to bring two 25 foot lengths of rope. Did you bring rope for your backpacking trip? (If, no.) Would you like to borrow two 25 foot lengths of rope in order to hang your food?" The researcher recorded which groups had bells, refused to borrow bells, had rope, and refused to borrow rope.

Treatment 5. This treatment involved a combination of Treatments 1 and 4. In addition to exposing individuals to a written, high fear message, the researcher asked group members whether or not they had bear bells and/or rope as described in Treatment 4. The researcher recorded which groups took the bear bells and/or rope. Noise making behavior was observed as described in Treatment 4.

Treatment 6. This treatment occurred exactly the same as Treatment 5. However, this treatment involved the combination of Treatments 2 and 4. The researcher gave individuals an ecologically oriented message and the opportunity to borrow bells and/or rope. Behavioral compliance was observed as described above.

Treatment 7. Again, this treatment occurred exactly the same as Treatment 5, except this treatment involved the combination of Treatments 3 and 4. The

researcher gave individuals a message stressing how easy it is to make noise and store food as well as the opportunity to borrow bells and/or rope. Behavioral compliance was observed as described above.

Treatment 8. This treatment was the no pretest control treatment. No treatment of any kind was administered to the group. The second researcher observed noise making behavior as described earlier.

Treatment 9. This treatment was the control with a pretest. Each individual was asked to complete a short questionnaire. The questionnaire asked individuals to report their behavioral intentions concerning appropriate behavior in occupied grizzly bear habitat. See Appendix C for a copy of the front-end questionnaire. Two forms of the questionnaire were administered, one to day hiking groups and one to backpacking groups. No treatment was exposed to this group. Again, behavior was observed as previously described.

Research Instrument

A questionnaire was mailed to all those individuals who agreed to cooperate in the study. The survey instrument was very similar to the instrument used in the 1987 study of backpackers' behavior in the Jewel Basin Hiking Area. Two versions of the questionnaire were used: a day hiker questionnaire (Appendix C) and a backpacker questionnarie (Appendix D). The questionnaire obtained demographic information, reported behavior (self-reports of participation in appropriate behaviors), experience levels, knowledge levels concerning bears, attitude information, etc.

The questionnaire was mailed first class to each backcountry user exposed to an experimental treatment or control. Each questionnaire was accompanied by a self-addressed stamped envelope and cover letter explaining the importance of visitor participation in the study (Dillman 1978). Questionnaires were mailed to participants in three different sets. Individuals who had been contacted during the weekends of July 12 - 14 and July 19 - 20 were mailed a questionnaire on July 25th. Individuals who were contacted July 26 - 29, August 2 - 4 and August 9 -10 were mailed a questionnaire on August 15. Individuals contacted after August 15 were mailed questionnaires on September 5. A postcard reminding individuals that their participation in the study was important was mailed two weeks following the initial mailing. If a questionnaire had not been returned within three weeks of the initial mailing a second questionnaire was sent to the participant.

Sample Response

A total of 760 visitors agreed to cooperate with the study. Of the 760 visitors, 662 were day hikers and 98 overnight users. The total mail questionnaire response rate for the sampling period was 78%. Disaggregated by type of user, this resulted in a sample of 521 (79%) day hikers and 69 (70%) overnight users. Table 3 indicates the sample size and response rate for each of the treatments and controls.

Table 3. Response rate and sample size for each experimental treatment.

Treatment	Response Rate, %			Sample Size		
	Day Hikers	Back-packers	Total	Day Hikers	Back-packers	Total
High Fear Message	72	83	75	39	15	54
Ecologistic Message	91	54	79	51	14	65
Easy Message	65	46	63	52	5	57
Behavioral Treatment	71	75	71	51	3	54
High Fear and Bells	82	83	82	83	5	88
Ecologistic and Bells	73	78	74	66	7	73
Easy and Bells	75	67	74	51	8	59
Control (no pretest)	88	100	89	60	8	68
Control (with pretest)	86	31	78	68	4	72

THE JEWEL BASIN VISITOR: CHARACTERISTICS OF DAY HIKERS AND BACKPACKERS

Because of the large number of tables that describe study results, they have been placed in Appendix F in order to make it easier to consult them.

Social Demographics

Few social-demographic characteristics differed between the day hikers and backpackers in Jewel Basin. Respondents ranged in age from 16 to 73 years, with a median age of 39. The median age of day hikers was 39, while backpackers tended to be slightly younger with a median age of 37. Little age differences existed between the control groups and the treatment groups. Day hiker treatment groups had a median age of 39, while control group participants had a median age of 36. No difference existed in the median age of backpacker treatment and control groups. Approximately the same number of day hiking males as females visited Jewel Basin (males = 256, females = 262). Overnight users were also approximately 50 percent males and 50 percent females (males = 54, females = 46).

Seventy percent of the visitors to Jewel Basin were Montana residents. These 83% resided in the Flathead Valley. Two percent of the total visitors resided in Canada with the remaining 28% residing throughout the United States. Approximately 80% of the visitors to Jewel Basin live in small cities (> 50,000 people) or rural environment (Table 4). No significant differnces existed among residences for individuals exposed to experimental treatments versus those individuals in the control groups.

Visitors' level of formal education was quite high, with 62% possessing bachelor's degrees and 45% of those possessing bachelor degrees have engaged in some graduate work. Backpackers have slightly higher education levels than day hikers. Twenty percent of backpackers possess a bachelor's degree, while only 17% of day hikers possess a bachelor's degree. Since individuals visiting Jewel Basin have high education levels, it is understandable that over 40% of the visitors worked in occupations classified as professional or technical (Table 5).

Half of the day hikers responded that this was their first visit to Jewel Basin, while only 38% indicated this was their first visit to the Basin. Over 30% of the individuals indicating they had been to Jewel Basin before had visited the Basin more than eight times. Day hikers in Jewel Basin were most likely to travel in groups consisting of family members, while backpackers tended to travel with friends (Table 6). It is interesting to note that very few individuals reportedly travelled alone, especially since the Forest Service recommends that individuals travel in groups of 4 - 6 individuals. Group sizes ranged from lone travellers to groups of 34 with the average group size being 4 individuals. No differences existed in group size between day hikers and backpackers or between individuals exposed to experimental treatments and control groups.

Visitor Knowledge and Beliefs about Proper Behavior

Visitors were asked to respond to several questions dealing with their knowledge and beliefs about appropriate behavior in grizzly bear country. First, individuals were asked to assess their knowledge of what to actions to take if they encountered a bear. For the most

part Jewel Basin visitors (69%) believed they knew what to do in case of an encounter. Backpackers (79%) tended to be slightly more confident than day hikers (68%). Little difference existed between experimental treatment participants and control group participants.

Second, Jewel Basin visitors were asked to indicate their beliefs concerning the ease or difficulty in practicing specific behaviors that are likely to reduce confrontations with bears. Backpackers were asked to indicate on a seven point easy to difficult scale how difficult or easy it was to practice the thirteen behaviors listed in Table 2. Since day hikers would not have to engage in all the behaviors listed Table 2, day hikers only responded to those behaviors that day hikers would practice if hiking in bear country. Mean scores by day hikers and backpackers are shown in Table 7. No significant differences existed in perception of behaviors for the hiking behaviors between day hikers and backpackers. Both groups perceived carrying out garbage as the easiest behavior to practice. Backpackers also evaluated washing dishes as an easy behavior to practice. Both groups perceived hiking in a large group and not hiking after dark as difficult behaviors to practice.

Visitors to Jewel Basin were also asked to evaluate the likelihood that practicing the behaviors listed in Table 2 would reduce potential confrontations with grizzly bears. Table 8 indicates the extent to which day hikers and backpackers believed the behaviors would reduce a potential confrontation. Few visitors (28.5%) perceive that wearing bear bells is very likely to reduce the likelihood of a confrontation. However, fifty-five percent to believe that making noise while hiking can very likely reduce the potential for a conflict with a grizzly bear.

To determine knowledge about bears, visitors were presented with a 10 item true-false quiz. The average score on the quiz was 69% correct with no difference among day hikers and backpackers. Table 9 indicates the percentage of respondents correctly answering each of the 10 items on the quiz. Most visitors knew that bears are usually shy and that hiking after dark is not an acceptable behavior in bear country. However, visitors lacked knowledge in the area of bear identification and bear behavior. For instance, only about half of the visitors to Jewel Basin knew that grizzly bears have dish shaped faces. Additionally, less than half the visitors to Jewel Basin were aware that bears are usually quite unpredictable in their behavior.

Visitors Attitudes Toward Hiking in Grizzly Country

Visitors were asked to respond to several questions inquiringabout their attitudes toward hiking in grizzly bear country. Specifically, the questions assessed individuals subjective probability of encountering a bear, how close individuals desired to get to a grizzly bear, and individuals perceptions of danger and safety while hiking in grizzly country.

To assess the subjective probability of encountering a bear on their hike, individuals were asked to indicate the likelihood of seeing a bear on their hike. Both day hikers and backpackers indicated similar subjective probabilities of seeing a bear (Table 10). For the most part, visitors (approximately 40%) believed they were somewhat likely to see a bear on their hike. Few believed they were extremely or very likely to see a bear on their trip in Jewel Basin. Backpackers tended to perceive their chances of seeing a bear as slightly higher than that of day hikers, though differences were not statistically significant. Lastly, no significant difference existed in the perceptions of individuals exposed to an

experimental treatment and those individuals in the control groups.

Visitors were also asked to indicate how close they wished to get to a grizzly bear on their hike. Backpackers tended to indicate they never wanted to see a grizzly bear more frequently than day hikers (Table 11). More day hikers (28%) tended not to think about how close they wanted to get to a bear than backpackers (16%). Again, no significant difference existed in treatment group visitors' perceptions concerning how close to a bear they wanted to get and those visitors in the control groups.

Lastly, individuals were asked to indicate their feelings of safety and danger while hiking in Jewel Basin. Table 12 indicates that most visitors felt safe or very safe while hiking (89%). Day hikers and backpackers tended to have similar perceptions of the level of safety they felt while hiking. Though, visitors primarily felt safe while hiking in Jewel Basin, most indicated that some danger is present due to the presence of grizzly bears. Table 13 indicates that fifty percent of the visitors to Jewel Basin perceived some danger while hiking. Twelve percent perceived grizzly bears represent a significant or extremely significant danger to Jewel Basin visitors. Backpackers tended to assess danger as being slightly more significant than day hikers. No significant differences existed among treatment or control group members.

Visitor Attitudes Toward Grizzly Bears

Four external beliefs about grizzly bears were measured. External beliefs are those beliefs which may affect primary belief and, thus, may have an affect on the extent to which individuals practice appropriate behavior. The four external beliefs were developed from Kellert's 1986 study of attitudes toward animals. The four beliefs, as described earlier, are ecologistic beliefs, naturalistic beliefs, moralistic beliefs, and negativistic beliefs. Each belief was measured using a standard Likert type scale using a *strongly agree* to a *strongly disagree dimension.* The items were group similar to the results of a cluster analysis from McCool and Braithwaite's 1988 study of appropriate behavior in occupied grizzly bear habitat. The Cronbach's alpha reliability coefficients and items for each belief scale are listed in Table 14.

Table 15 indicates the differences in strengths to which day hikers and backpackers held each of the beliefs. Ecologistic beliefs were held the strongest, while negativistic beliefs were held the weakest. No significant differences in beliefs existed between day hikers and backpackers. Additionally, no significant differences in beliefs scores existed between treatment group members and control group members.

RESPONSE TO PERSUASIVE TECHNIQUES: TESTS OF STUDY HYPOTHESES

Visitor Behavior

Hypothesis One states that "The three behavior scores (intended, reported and observed) will be positively correlated with each other." To test this hypothesis behavioral intentions, reported behavior and observed behavior were measured. Since a pretest may sensitize individuals to appropriate behavior, behavioral intentions were only assessed from those individuals in the control group with a pretest. Table 16 indicates the extent to which individuals reported that they intended to participate in each of the recommended behaviors. Few day hikers and no backpackers intended to hike in large groups or wear bear bells. Most (66%) planned to make noise while hiking in Jewel Basin. All visitors who responded to the pretest intended to carry out garbage and not hike after dark.

Reported behavior was measured similar to behavioral intentions. Individuals were asked in the questionnaire to what extent did you practice the appropriate behaviors necessary for grizzly country. Table 17 indicates the frequency with which visitors participated in appropriate behavior. This table includes all participants in the study not just those individuals composing the pretest control group. Frequencies for the pretest control group are included in the parentheses after the total sample frequency. In line with the behavioral intentions, most individuals reported that they carried out their garbage and didn't hike after dark. Similarly, a high percentage of backcountry visitors (87.8%) reported that they made noise while hiking. However, few persons reported hiking in large groups (28.9%) and wearing bear bells (22.1%).

Noise making was observed approximately 1/2 mile from the trailhead. A major trail junction is located approximately 3/4 mile up the trail, so behavior had to be observed before individuals dispersed throughout the Jewel Basin hiking trails. Using a decibel meter, group noise behavior was measured. The group noise level was attributed to each individual within the group, thus all group members received the same noise score though only one or two individuals may have been actually making the noise at the time the noise level was monitored.

Noise base level (decibel reading prior to group hiking by noise monitoring point) was subtracted from the highest decibel reading obtained as group hiked past monitoring area. The average noise level for the entire population was 3.94 decibels above the base level. Backpackers tended to make slightly less noise hiking (3.3 decibels) than day hikers (4.02 decibels). Table 18 indicates the type of noise Jewel Basin visitors made while hiking. Most visitors made noise on the trail by hiking. Only twenty percent made noise from wearing bear bells.

To test Hypothesis 1 the correlation of the three behavior scores was limited to only those individuals who participated in the control group with the pretest. As stated earlier, actual behavior constitutes the difference in the base decibel level and the decibel level of the group as it passed a particular spot on a trail. The behavioral intentions score is the summation of the scale items listed in Table 16. The reported behavior score is also a

summation of the scale items listed in Table 17. Table 19 indicates the Spearman's Rho correlation coefficients for the three behavior scores. Though all three behavior scores were correlated positively, the correlation between behavioral intentions and reported behavior was significant. This suggests that Jewel Basin visitors intend to behave appropriately while hiking and believe they are behaving properly, but in actuality may not be engaging in appropriate behavior.

To investigate further the correlations among the three scores, various components of the summation of the behavioral intentions and reported behavior scales were examined. Specifically, intentions to make noise and wear bear bells and the extent to which visitors reported making noise and wearing bear bells were examined. All four scale items were correlated somewhat with the decibel meter reading, but individuals' behavioral intentions to wear bear bells was significantly correlated with the amount of noise a group made while hiking.

Written Persuasive Communication

The following three hypotheses examine the extent to which compliance rates in appropriate behavior differed among the three treatment groups receiving a written persuasive communication at the trailhead. Hypothesis Two states that behavioral compliance will be for individuals who received a written message versus those individuals who did not receive a written message. The following analysis makes no differentiation between the types of messages individuals received. Individuals who received a written message (Treatments 1, 2, 3, 5, 6, 7) were compared directly against those individuals in the behavioral treatment and control groups (Treatments 4, 8, 9). ANOVA (Table 20) indicates that a significant difference exists in the mean decibel levels for individuals who received a message and those individuals who did not. Thus, individuals receiving written information had a greater compliance rate in noise making behavior than individuals who received no written information.

As shown above, written information can significantly increase behavioral compliance. However, do different types of written messages (i.e. high fear, ecologistic, and easy) yield different compliance rates? Hypothesis 3 examines the difference between the high fear written message and the message stressing the ease of engaging in appropriate behavior.

As stated earlier, due to adverse publicity the high fear message was down graded approximately half way through the sampling period. It was necessary to examine the two versions of the fear message to determine if any effects on behavior or perceptions of danger and safety differed. Table 21 indicates that no significant differences existed in the effects of the first version of the high fear message and the second version. Therefore, the first and second version will be combined as one treatment the high fear treatment.

In the message evaluation period (i.e. pretest phase), students rated the easy message to be the least influential of the three written messages. Therefore, Hypothesis 3 states that behavioral compliance will be greater for individuals receiving a high fear message than those individuals receiving a message stressing the ease of engaging in appropriate behavior. Table 22 indicates that no significant differences existed in the decibel levels of individuals who received the high fear message and individuals who received the easy message. However, as Table 20 indicated significant differences do exist between the written messages and

the control groups (Treatment 8 and 9). This may suggest that the type of written message individuals receive may not necessarily influence behavioral compliance, but rather just receiving a written message may be enough to increase participation in appropriate behavior. Since the local media responded very negatively to the high fear message being distributed to Jewel Basin visitors, this suggests that dispersing a publicly accepted message such as the easy message may be most appropriate for the Jewel Basin area.

A previous study (McCool and Braithwaite 1989) determined that backpackers in Jewel Basin exhibit strong negativistic beliefs toward grizzly bears. However, they also determined that individuals possessing ecologistic beliefs were more likely to engage in appropriate behavior than individuals possessing negativistic beliefs. This suggests that sensitizing Jewel Basin visitors to an ecologically oriented way of viewing the bear through written communication may increase behavioral compliance. Since the emotional arousal associated with the high fear message may create negativistic beliefs in visitors, the ecologistic message may be a more effective message for gaining behavioral compliance. Thus, Hypothesis 4 states that behavioral compliance will be greater for individuals receiving the ecologistic message than those receiving the high fear message.

ANOVA (Table 23) indicates that no statistically significant differences exist in decibel levels for individuals receiving the ecologistic message and the high fear message. However, as the results of Hypothesis 1 indicated, significant differences existed between message treatments and the control groups. Similar to the results of Hypothesis 2, this suggests that the type of message may not be important for increasing behavioral compliance, but rather dispersing a written message may be of importance.

Behavioral-based Persuasion

The following two hypotheses examine the effects behavioral-based persuasion may have on gaining behavioral compliance. Hypothesis 5 states that noise making or decibel levels will be greater for individuals who received a bell at the trailhead than individuals who did not receive a bell. ANOVA (Table 24) indicates that individuals who received bells at the trailhead made no more noise than individuals who had bells or refused to take bells. Additionally, individuals involved in treatments which did not involve being given bells tended to make no more noise than individuals offered bells.

Individuals were asked whether they brought bear bells on their hike. Twenty-one percent (N=121) stated that they did bring bells on their trip while 79% (N=464) did not. ANOVA indicated that no significant difference (F=.8476) existed between the noise making behavior of individuals who brought bells and individuals who did not. Lastly, an additional ANOVA (Table 25) indicates that individuals involved in the behavioral treatment exclusively made significantly less noise than individuals who received a written message. These individuals' noise levels were similar to the noise levels of control group members. Individuals who received a message and the opportunity to borrow a bell made slightly less noise, though significant, than individuals who only received a message. These findings suggest that dispersing bear bells at the trailhead may not increase the level of noise visitors make while hiking.

Similar to the previous hypothesis, Hypothesis 6 states that individuals who were given a rope at the trailhead will exhibit greater compliance in food storage

behaviors than individuals not given a rope at the trailhead. Only two individuals (2.9%) were given rope at the trailhead. Seventeen (24.6%) individuals brought their own rope, five (7.2%) refused to borrow rope and forty-five (65.2%) were not involved in treatments dispersing rope. Due to the small sample size of individuals being given rope it is difficult to determine the effects of giving rope to backcountry users.

Therefore, the analysis will examine differences in food reported food storage behavior among those individuals who reportedly carried a rope into the backcountry (N=52) and those individuals who did not (N=17). Table 26 indicates that no significant difference existed in reported food storage behavior between individuals who brought rope and those who did not. Again, this suggests that giving rope to individuals at the trailhead may not necessarily indicate greater behavioral compliance, since no significant difference existed in reported food storage behavior. Visitors reporting that they did not have rope must have either borrowed other group members' rope or utilized other means for hanging their food in trees.

Factors Influencing the Effectiveness of Persuasion Strategies

As stated earlier, past research has indicated that external beliefs can affect primary beliefs which in turn can influence behavior (Fishbein and Ajzen 1975). For example, individuals' beliefs about grizzly bears can indirectly influence how they behave while hiking in grizzly country. Additionally, knowledge (primary beliefs) about appropriate behavior has been directly associated with behavioral intentions. Therefore, knowledge about appropriate behavior, consequences of appropriate behavior, and knowledge about bears should all be associated with behavior.

Since past research has indicated a relationship between external beliefs and primary beliefs, Hypothesis 5 states that individuals' attitudes (ecologistic, moralistic, naturalistic) will be positively correlated with their knowledge of appropriate behavior, consequences of the engaging in appropriate behavior, and knowledge about bears. To test this hypothesis, a summated scale was developed upon visitors perceptions of the likelihood of each of the thirteen behaviors for reducing confrontations with grizzly bears (i.e. consequences of engaging in appropriate behavior). Knowledge was assessed through a ten item true-false exam. Several of the questions examined individuals' knowledge of appropriate behavior and the remaining questions determined individuals' knowledge about grizzly bears. Using Spearman's Rho correlation coefficients, Table 27 indicates that individuals' attitudes toward grizzly bears are positively correlated with knowledge about bears though not statistically significant from zero. However, naturalistic and moralistic beliefs are negatively correlated with individuals' knowledge of appropriate behavior. These findings suggest that while individuals may hold certain beliefs about grizzly bears, they may not be knowledgeable about appropriate behavior and the biology and ecology of grizzly bears.

Additionally, the correlation between the three attitudes and the consequences of appropriate behavior is positive but not statistically significant. This suggests that though individuals may hold certain beliefs about grizzly bears, they may not know how appropriate behavior may reduce the likelihood of a confrontation.

The following three hypotheses examine how various message factors may influence visitors' confidence in their external beliefs. For example, individuals

holding ecologistic attitudes towards grizzly bears may be more receptive to an ecologistic message which should in turn provide greater confidence in their existing external beliefs. The greater the strength of external beliefs, the more likely these beliefs may affect primary beliefs, thus indirectly influencing behavior. Therefore, Hypothesis 8 states that behavioral compliance will be greatest for individuals holding an ecologistic attitude who receive the ecologistic message.

To test this hypothesis, four behaviors were examined, actual noise level, reported noise making behavior, reported wearing of bells, and a total reported behavior score which is the summated score of all the behaviors listed in Table 2. The analysis included only those individuals exposed to the ecologistic message. Lastly, the ecologistic scores which ranged from 1.0 to 5.0 were truncated to integer parts (i.e. 4.7 was reduced to 4). Table 28 indicates the mean behavior score for a five point ecologistic score. As the table indicates, there was no significant difference in behavior scores for individuals holding high ecologistic beliefs and low ecologistic beliefs. This suggests that written messages focusing on visitors' pre-existing beliefs may not necessarily be strengthen those beliefs.

Hypothesis 9 is similar to Hypothesis 8 except that it concerns negativistic beliefs and the high fear message. The hypothesis states that behavioral compliance will be greater for individuals holding a negativistic attitude who are exposed to the high fear message. Again, the analysis focused on the four behaviors examined in the previous hypothesis. The negativistic score was truncated similarly to the ecologistic score and the analysis contained only those individuals exposed to the high fear message. Table 29 indicates that no significant difference in mean behavior scores for individuals holding high negativistic attitudes toward bears and individuals possessing low negativistic attitudes.

Hypothesis 10 states that individuals who were exposed to the easy message and rated the behaviors as easy to engage in will have greater behavioral compliance than those individuals who rated the behaviors as somewhat difficult. The analysis included only those individuals who were exposed to the easy message. Again, the four behaviors examined in the two previous hypotheses were investigated. Actual noise levels and reported noise making behavior were compared against visitors rating of the ease of making noise only. The analysis did not include the ratings of other behaviors. Reported behavior concerning the wearing of bear bells was only examined against an individual's rating of the ease or difficulty in wearing a bear bell. Lastly, the entire reported behavior score (a summation of the thirteen behavior scores) was compared against the beliefs about behavior score (the summation and truncation of all the behaviors rated as easy or difficult to practice).

Table 30 indicates that some significant differences did exist between individuals who rated behaviors as easy to practice and those who rated the behaviors as difficult to practice. No significant differences existed in the mean decibel level for individuals who rated making noise as easy and those rating it difficult. However, individuals who rated making noise as easy reported that they made noise more frequently than individuals who rated making noise as difficult. The results of Hypothesis 1 indicates that visitors had good intentions to behavior appropriately and even reported that they did, however, the correlation between reported behavior and actual behavior was not significant. Thus, people given the

easy message accepted the message that they needed to make noise on the trail and rated that the behavior as easy to practice, but the message is not being acted upon resulting in no significant differences in actual noise behavior.

Individuals who rated that wearing bear bells was easy also exhibited significantly higher reported behavior scores for wearing bear bells than individuals who rated bear bells as difficult to wear. Again, this suggests that individuals are accepting the message, but not necessarily yielding to the message. The last analysis for this hypothesis examined the total reported behavior score and the total beliefs about behavior score. Though one significant difference did exist, the difference does not support the hypothesis. No significant differences exist between those who rated the behaviors as easy and those who rated the behaviors as more difficult to practice. This suggests that individuals may be accepting certain behaviors mentioned in the written message but not accepting other behaviors.

Most Effective Persuasion Strategy

The last hypothesis attempts to identify the most effective persuasion strategy. It is hypothesized that exposing individuals to two forms of persuasion (message based and behavioral based) should result in greater behavioral compliance. The nine treatments were divided into four treatment groups: (1) individuals who received a written message exclusively, (2) individuals who received a behavioral treatment exclusively, (3) individuals who received both a written message and the opportunity to borrow a bear bell, and (4) individuals involved in the control groups.

Similar to Hypotheses 2 and 5, the results of Table 25 indicate that individuals receiving a message tend to make more noise than individuals who did not receive a message. However, the results indicate that individuals who receive a message exclusively make significantly more noise than individuals who were involved in other treatment groups. This suggests that the behavioral based persuasion of offering individuals bear bells at the trailhead does not increase behavioral compliance. Since, individuals who were involved in the combination approach made less noise than individuals given messages exclusively, it could be concluded that this behavioral approach decreased the amount of behavioral compliance.

Additionally, noise making for individuals involved in the treatment offering bear bells but no message made less noise than individuals in the control groups, though the difference is not significant. This suggests that offering bear bells may reduce behavioral compliance rather than increasing it.

IMPLICATIONS AND CONCLUSIONS

Table 31 summarizes the results of the eleven hypotheses tested in this study. Overall, the results indicate that dispersing a written message explaining appropriate behavior for grizzly bear country to backcountry users at a trailhead can increase behavioral compliance. Behavioral compliance varied very little by the type of message appeal (fear, easy, ecologistic). Behavioral manipulation (i.e. dispersal of bear bells) did little to increase noise making behavior, both for the treatment group receiving bells exclusively and treatment groups receiving a written message and bear bells.

The results of this study point to several important implications and conclusions. First, though behavioral intentions and reported behavior were highly correlated, a weak correlation exists among these behavior scores and actual behavior, indicating an interruption in the communication model. We cannot assume that the dispersal of information will result in behavioral compliance. Second, written messages increased behavioral compliance. However, the type of message appeal did not significantly affect visitor behavior. Third, providing visitors with bear bells at the trailhead did not significantly increase the amount of noise individuals made while hiking. Individuals who received bear bells only with no written message made significantly less noise than individuals receiving a message.

Fourth, individuals' pre-existing attitudes concerning grizzly bears and appropriate behavior had little affect on how individuals responded to various written messages. And, lastly, providing visitors with a written message exclusively was the most effective strategy for increasing behavioral compliance. The combination strategy (i.e. providing both a written message and bear bells) was not as effective as providing a written message only. The following sections will discuss each of these implications or conclusions in turn.

Visitor Behavior

Fishbein and Ajzen (1975) state that behavioral intentions are highly predictive of actual behavior. Results of this study, however, indicated that Jewel Basin visitors' behavioral intentions were not highly predictive of actual behavior. Behavioral intentions were found to be highly predictive of an individual's reported behavior, but neither were found to be predictive of actual behavior. This finding indicates a flaw in the communication model.

Jewel Basin visitors intend to behave properly while in the backcountry and report that they are behaving appropriately. However, results indicate that though they intend to behave appropriately and believe they are behaving appropriately, backcountry users are not actually engaging in the behaviors that they intended to practice. This indicates that visitors are accepting the message to practice certain behaviors, even to the point of reporting that they are engaging in the appropriate behaviors. When it comes to actual behavior, however, visitors aren't participating in the recommended behaviors entirely.

Unfortunately, this analysis had to be restricted to those individuals involved in the control group with a pretest. Thus, it does not indicate the impact of the written message dispersed at the trailhead on actual behavior. Perhaps the messages

dispersed at the trailhead strengthened the link between behavioral intentions and actual behavior. It would have been ideal to expose half of the individuals in each treatment to the pretest and examine this relationship. However, a concern for sensitization effects and small sample size directed the research to limit the pretest to one control group only.

Since results indicate no significant differences in the reported behavior and actual behavior of individuals in the control group with a pretest and the control group receiving no pretest, sensitization concerns may not be of a major concern for future research. Additionally, since the overall results indicated that little difference existed in behavior scores among the message appeal types, future research needs to examine only message form. Reducing the number of message types will significantly decrease the number of treatment groups, thus limiting the concern for small sample size.

Written Persuasive Communication

The communication model indicates that if individuals receive and accept a message concerning appropriate behavior, they will engage in the recommended behavior. Reported participation rates (Table 17) in the recommended behaviors indicate that individuals are indeed receiving and accepting the message concerning some of the appropriate behaviors. However, previous results lead to the suspicion that message acceptance is not resulting in behavioral compliance.

Since control group members had similar reported behavior scores as treatment group members, it could be concluded that individuals have been exposed to and accepted a message concerning appropriate behavior prior to their trip in Jewel Basin. However, study results indicate that individuals who received a written message at the trailhead exhibited greater compliance in actual behavior than individuals who did not receive a message at the trailhead. This suggests that the message individuals receive at the trailhead may strengthen the link between the acceptance of a message and yielding to or engaging in the recommendations of that message.

Further investigation of the impact of written messages on behavior indicated that the type of message appeal (i.e. high fear, ecologistic, and easy) had little affect on behavioral compliance. The type of message one receives at the trailhead makes little difference for increasing behavioral compliance. Anxiety producing messages, such as the high fear message, which may cause unnecessary emotional arousal, was found to be no more effective than the more milder ecologistic and easy messages. This suggests that agencies may not need to rely on fear as a means for gaining behavioral compliance in hazardous settings. The use of messages more in tune with the recreational experience (i.e. ecologistic) may result in the same amount of behavioral compliance without creating unnecessary fear or emotional arousal.

Additional research may want to investigate the effects that personal contact with the visitor may have on behavioral compliance. A researcher dispersed the written messages and/or bear bells to Jewel Basin visitors. If the written message were simply posted on a sign at the trailhead, individuals may not be as inclined to read it. Personal contact may have enhanced behavioral compliance. The researcher was free to provide other verbal information to visitors. Many visitors asked for information on snow conditions, areas where other individuals are hiking, lakes where individuals are camping, and the characteristics of various trails throughout Jewel Basin. Providing information requested by the visitor may have created a greater rapport between

visitors and the researcher. This may have fostered greater acceptance and yielding to the written message provided to the visitor from the researcher.

Behavioral-based Persuasion

Previous studies (McCool and Braithwaite 1987) suggested that environmental manipulation or behavioral-based persuasion may increase compliance in appropriate behaviors. The rule of reciprocity was used to determine if behavior might be manipulated by covertly persuading visitors to feel obligated to repay the researcher for providing free bear bells. The visitor should have felt obligated to wear the bear bell and make noise while hiking. However, many individuals (56%) offered bells declined to accept them. Many visitors indicated that they did not like to wear bear bells and preferred to make noise using different methods (i.e. talking, yelling, whistling). Results indicated that individuals who took bells made no more significant noise than individuals who refused bells. Thus, indicating that both groups made similar noise levels.

Though no differences in noise levels existed, the rule of reciprocity may still have applied in this situation. Individuals were given bells and asked to wear them while hiking. To accommodate the rule, individuals needed to only wear the bear bell to repay the researchers request. Many of the individuals returned to the trailhead wearing the bear bells they had borrowed, thus accommodating the request of the researcher. Bear bells, however, are not louder than other forms of noise (i.e. talking, yelling, whistling). This suggests that message designers may want to advocate several methods for making noise, especially if over half the sample population declined to accept the bear bells.

Results did indicate that if visitors received a message with the opportunity to borrow a bear bell, they tended to make significantly more noise than individuals receiving only the opportunity to borrow a bell. However, individuals who received a message exclusively made significantly more noise than individuals receiving both a message and the opportunity to borrow a bell. Therefore, providing bear bells for individuals to borrow at the trailhead may not be as effective as simply providing a written message to make noise. Providing a written message exclusively to visitors may not only be more cost effective to land management agencies, but may reap greater behavioral compliance.

Methodologically, it was very difficult to observe backpackers' food storage techniques in the backcountry. And, it was difficult to prevent backpackers from knowing that their behavior was being observed at backcountry campsites. Additionally, many backpackers tended to arrive at the trailhead in the evening. These individuals tended to set up camp in the dark, prepare their food in the dark, and store their food in the dark, making behavioral observation virtually impossible. Lastly, the backpackers in Jewel Basin camped at a large number of lakes in the basin. One or two researchers would have difficulty trying to travel to all of the possible camping locations. Thus, causing the analysis to focus on reported behavior exclusively. Future research needs to identify means for observing backcountry behavior without being obtrusive to backcountry users. Backcountry behavior could be observed in the early morning, however, researchers separate from the ones at the trailhead would need to be observers as many anglers arrive at the trailhead in the early morning.

Factors Influencing Effectiveness of Persuasion Strategies

Fishbein and Ajzen (1975) state that external beliefs, such as an individual's attitude toward grizzly bears can affect primary beliefs, those beliefs which are the immediate precursor to behavioral intentions. Thus, individuals' attitudes toward grizzly bears could indirectly affect their backcountry behavior. Since these attitudes can affect primary beliefs, it was hypothesized that individuals' attitudes toward grizzly bears would be positively correlated with individuals' knowledge of appropriate behavior, beliefs about the consequences of engaging in appropriate behavior, and knowledge about bears. Results indicated that attitudes were not strongly correlated with individuals primary beliefs (i.e. knowledge and beliefs about appropriate behavior). This finding may provide insight into why individuals' pre-existing attitudes had no effect on the acceptance and yielding to the written messages.

It was hypothesized that individuals with ecologistic attitudes would exhibit greater behavioral compliance if they received an ecologistic message. Similarly, individuals with negativistic attitudes should exhibit greater behavioral compliance if they received a high fear message. However, results indicated that no significant difference existed in behavior between individuals who exhibited strong ecologistic or negativistic attitudes and those who expressed weak attitudes. This suggests that message designers do not have to be extremely sensitive to backcountry users' pre-existing attitudes toward grizzly bears. However, this finding does not suggest that messages can be designed without audience characteristics being taken into account. Future research needs to identify what audience characteristics may influence the acceptance of and yielding to persuasive messages.

For example, it was hypothesized that behavioral compliance would be greater for individuals who rated the behaviors as easy to practice (a primary belief) and received a message stressing how easy the recommended behaviors were to practice than individuals who rated the behaviors as difficult. Results indicated that some significant differences did exist, but no significant differences existed in mean scores of actual noise making behavior. The significant differences existed between mean scores of visitors' reported behavior. Again, this finding suggests that individuals are accepting the message, but are not necessarily yielding to or enacting the recommendations of the message. Message designers must be sensitive to the effects that these primary beliefs may have on message acceptance. Future research needs to investigate those factors which may be weakening the linkage between message acceptance and yielding to the message.

Most Effective Persuasion Strategy

Lastly, it was originally hypothesized that a combination of two persuasive strategies (i.e. message-based and behavioral-based) would yield the greatest behavioral compliance. Study results indicated that a single approach, the message-based, was the most effective for gaining behavioral compliance. Individuals who received a message exclusively exhibited the greatest behavioral compliance. If individuals were exposed to both a message and given a bell, the mean noise level was significantly less than those who received only a message. However, the noise level of these individuals (both message and bell) was significantly greater than those individuals who received a bell exclusively or the control group members.

This suggests that persuasive communication designers should focus more energy on the development of the written portion of a communication program. These findings do not suggest the complete abandonment of behavioral-based persuasion. As stated earlier, land management agencies have very effectively increased behavioral compliance through environmental manipulation (i.e. routing of trails, facility management). However, in a setting such as Jewel Basin, persuasive communicators should direct their emphasis to the written message as a means for gaining the greatest behavioral compliance.

Recommendations for Future Research

Results of this study indicate that exposing backcountry visitors to written persuasive messages can increase behavioral compliance in recommended backcountry behaviors for reducing the likelihood of having a confrontation with a grizzly bear. Land management agencies can develop written communication and information programs to increase behavioral compliance. However, the fact that many of the hypotheses were not statistically supported, suggests a need for further research.

The findings of this study indicate that a written appeal is the most effective means for gaining behavioral compliance. The type of appeal did not significantly influence how individuals responded to the written message. This suggests that message designers can develop written information programs that are harmonious with the type of recreation experience the land management agency is providing. Messages creating unnecessary emotional arousal, such as high fear, should be avoided as it does not accentuate components of the experience. Messages should be in tune with the type of opportunities and experiences available to the visitor.

The research indicated that several factors, pre-existing attitudes toward bears and an evaluation of the ease of engaging in appropriate behavior, had no or little effect on how visitors responded to the written message. Since the research indicates that backcountry visitors are accepting the message but not always yielding to or engaging in the behaviors, other factors may be interrupting the linkage between behavioral intentions and actual behavior. Other factors, such as previous experience, exposure to other messages concerning proper behavior, age, need to examined to determine if perhaps other extraneous factors are disrupting this linkage.

Additionally, visitors report that they are engaging in appropriate behavior at fairly high rates. Future research needs to examine the discrepancy between reported participation rates and actual rates. Why are people reporting they are engaging the behaviors when they aren't? Are visitors responding to the questionnaire in a socially desirable manner (i.e. responding in manner consistent with what the researcher may want them to)? If so, a different form of measuring reported behavior may need to be developed. Or, do visitors truly believe that they are engaging in the recommended behaviors? If so, the persuasive communication program is not effective and future research needs to examine why the discrepancy exists. Perhaps visitors are misinterpreting the message, such that they understand cognitively what they are to do, but aren't sure how to behaviorally act upon the recommendations.

Future research also needs to investigate how the personal contact of the researcher in this study may have influenced behavior. If a written message were simply posted on a trailhead sign or provided in trail brochures, would similar results be found? Perhaps the rule of

reciprocity was operating in the study. Since the researcher provided many visitors with additional information about Jewel Basin, visitors may have felt indebted to comply with the requests of the researcher and engage in the behaviors suggested in the written message. Future research will be able to determine the effects of the researchers presence on the visitor behavior.

This study yielded some interesting findings concerning the usage of bear bells for making noise in grizzly bear habitat. Many visitors may perceive the bear bell as extremely intrusive to their hiking experience (i.e. 56% refused to accept bells because they did not like them). Additional research needs to examine this finding. What types of noise do backcountry visitors to occupied grizzly habitat prefer to make and hear while hiking? Since individuals who carried bear bells made similar noise levels as those who did not carry bear bells, perhaps messages may want to stress that individuals make noise via specific methods (i.e. singing, whistling, talking, yelling, clapping).

Further research also needs to determine if bear bells can create a false sense of security in backcountry visitors. Bear bells tend to make similar noise levels every time they shake. The human voice can make various sound levels given different settings and situations. Do visitors rely too heavily on the bear bell to make noise or do they mix the use of a bear bell with the human voice?

Lastly, future research may want to investigate how bears respond to various types of noise that visitors make while hiking. Does talking alert a bear more quickly than a bell? Do bears hear certain tones and timbers better than other tones or timbers? Determining the answers to these questions may help land management agencies provide information on the most effective techniques for alerting a bear to the presence of humans.

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APPENDIX A

POSTTEST-ONLY EXPERIMENTAL DESIGN

Group			Treatment	Posttest 1	Posttest2
A	A		X_1	O_2	O_3
B	A		X_2	O_2	O_3
C	A		X_3	O_2	O_3
D	A		X_4	O_2	O_3
E	A		X_5	O_2	O_3
F	A		X_6	O_2	O_3
G	A		X_7	O_2	O_3
H	A			O_2	O_3
I	A	O_1		O_2	O_3

A - Random assignment to experimental groups

O_1 - Behavioral Intentions (Front - End Questionnaire)

X_1 - Written High Fear Message

X_2 - Written Ecologically Oriented Message

X_3 - Written Message Stressing Ease

X_4 - Behavioral Manipulation (Bells and Rope)

X_5 - High Fear Message and Bells and Rope

X_6 - Ecological Message and Bells and Rope

X_7 - Easy Message and Bells and Rope

O_2 - Reported Behavior (Mail Questionnaire)

O_3 - Observed Behavior

APPENDIX B

SAMPLING PLAN

	Time Period								
Weekend	1	2	3	4	5	6	7	8	9
7/12-7/14	I	D	F	A	H	B	C	E	G
7/19-7/21	E	G	H	B	C	I	A	F	D
7/26-7/28	F	A	G	I	B	C	H	D	E
8/2-8/4	H	E	C	F	G	B	A	I	D
8/9-8/11	B	G	E	F	I	C	D	H	A
8/23-8/25	B	D	E	I	F	H	A	C	G
8/30-9/1	A	H	F	C	G	B	E	D	I
9/2		SN330-530		M8-10		M1030-1230		M1-3	
		A		G		G		H	

Time Periods

1 - Friday 1-3pm
2 - Friday 3:30-5:30pm
3 - Saturday 8-10am
4 - Saturday 10:30am-12:30pm
5 - Saturday 1-3pm
6 - Saturday 3:30-5:30pm
7 - Sunday 8-10am
8 - Sunday 10:30am-12:30pm
9 - Sunday 1-3pm

Experimental Treatments

A - Written High Fear Message
B - Written Ecologically Oriented Message
C - Written Message Stressing Ease
D - Behavioral Manipulation (Bells and Rope)
E - High Fear Message and Behavioral Manipulation
F - Ecological Message and Behavioral Manipulation
G - Easy Message and Behavioral Manipulation
H - Control (No Pretest)
I - Control with Pretest

APPENDIX C

FRONT-END QUESTIONNAIRE

1. Listed below are number or backcountry camping techniques. Please indicate how frequently your group plans to practice each during your hiking/backpacking trip.

	(Circle one answer)			
Store food in trees*	ALWAYS	USUALLY	SELDOM	NEVER
Make noise on trail	ALWAYS	USUALLY	SELDOM	NEVER
Camp or hike in large groups (over 5)	ALWAYS	USUALLY	SELDOM	NEVER
Wear or use bear bells	ALWAYS	USUALLY	SELDOM	NEVER
Wash dishes after each meal*	ALWAYS	USUALLY	SELDOM	NEVER
Cook 300 feet away from campsite*	ALWAYS	USUALLY	SELDOM	NEVER
Cook fish/bacon for meals*	ALWAYS	USUALLY	SELDOM	NEVER
Use odor restrictive containers*	ALWAYS	USUALLY	SELDOM	NEVER
Wear clean clothes while sleeping*	ALWAYS	USUALLY	SELDOM	NEVER
Cook downhill from sleeping area*	ALWAYS	USUALLY	SELDOM	NEVER
Camp away from animal or hiking trails*	ALWAYS	USUALLY	SELDOM	NEVER
Carry garbage out	ALWAYS	USUALLY	SELDOM	NEVER
Hike after dark	ALWAYS	USUALLY	SELDOM	NEVER

*Backpacking groups only

2. What does your group feel is the likelihood of seeing a griz bear on this trip? (Circle one letter)

a. EXTREMELY LIKELY
b. VERY LIKELY
c. MODERATELY LIKELY
d. SOMEWHAT LIKELY
e. NOT AT ALL LIKELY
f. DON'T KNOW

3. How close does your group want to get to a grizzly bear? (Circle one letter)

a. NEVER WANT TO SEE ONE
b. WANT TO VIEW ONE FROM A GREAT DISTANCE
c. WANT TO GET CLOSE ENOUGH FOR A GOOD LOOK OR PHOTOGRAPH
d. DIDN'T THINK ABOUT IT

4. To what extent does your group feel grizzly bears represent a danger to backcountry campers in this area? (Circle one letter)

a. VERY INSIGNIFICANT DANGER
b. INSIGNIFICANT DANGER
c. SOME DANGER
d. SIGNIFICANT DANGER
e. EXTREMELY SIGNIFICANT DANGER
f. DON'T KNOW

5. Does your group feel that they would know what to do if they encounter a grizzly bear in the backcountry?

a. YES
b. UNCERTAIN
c. NO

NAME _____

STREET _____

CITY _____ STATE/PROVINCE _____ ZIP CODE _____

SEX: M F AGE _____

NUMBER OF PREVIOUS TRIPS IN JEWEL BASIN HIKING AREA _____

APPENDIX D

DAY HIKER QUESTIONNAIRE

U N I V E R S I T Y O F M O N T A N A
School of Forestry
Missoula, Montana 59812

Backcountry Visitor Survey

Please answer all questions as they relate to your most recent hiking trip in the Jewel Basin Hiking Area.

---

1. Was this your first visit to Jewel Basin Hiking Area? (Circle one number)

   1 YES (Please go to Question 2)
   2 NO (Please answer the following)

   Including your recent visit, about how many times have you hiked in Jewel Basin?

   1 ONE TO THREE TIMES
   2 FOUR TO SEVEN TIMES
   3 EIGHT TO TWELVE TIMES
   4 OVER TWELVE TIMES

2. Prior to this visit, about how many hiking trips have you taken in Glacier or Yellowstone National Parks, or in backcountry areas in Montana? (Circle one number)

   1 NONE
   2 ONE TO THREE TIMES
   3 FOUR TO SEVEN TIMES
   4 EIGHT OR MORE TIMES

3. What type of group did you travel with on **this** hiking trip? (Circle one number)

   1 ALONE
   2 FAMILY
   3 FRIENDS
   4 FAMILY AND FRIENDS
   5 GUIDE OR OUTFITTER
   6 CLUB OR ORGANIZED GROUP

4. How many people were in your group including yourself?

   NUMBER OF PEOPLE _____

5. What type of equipment did you take on this trip? (Circle **all** numbers that apply)

   1 FISHING ROD
   2 ROPE
   3 FRESH FOOD
   4 AIR HORN
   5 KNIFE
   6 SAW OR HATCHET
   7 BEAR SPRAY
   8 FIRE ARM
   9 CANNED FOOD
   10 BEAR BELLS
   11 FREEZE DRIED/DEHYDRATED FOOD
   12 ODOR PROOF CONTAINER

6. What was the likelihood of seeing a grizzly bear on this trip? (Circle one number)

   1 EXTREMELY LIKELY
   2 VERY LIKELY
   3 MODERATELY LIKELY
   4 SOMEWHAT LIKELY
   5 NOT AT ALL LIKELY
   6 DON'T KNOW

7. When you were planning your hiking trip into Jewel Basin, how close did you want to get to a grizzly bear? (Circle one number)

   1 NEVER WANTED TO SEE A GRIZZLY BEAR
   2 WANTED TO VIEW ONE FROM A GREAT DISTANCE
   3 WANTED TO GET CLOSE ENOUGH FOR A GOOD LOOK OR PHOTOGRAPH
   4 DIDN'T THINK ABOUT IT

8. To what extent do you feel grizzly bears represent a danger to backcountry hikers in this area? (Circle one number)

   1 VERY INSIGNIFICANT DANGER
   2 INSIGNIFICANT DANGER
   3 SOME DANGER
   4 SIGNIFICANT DANGER
   5 EXTREMELY SIGNIFICANT DANGER
   6 DON'T KNOW

9. How safe did you feel while on this trip? (Circle one number)

   1 VERY UNSAFE
   2 UNSAFE
   3 DID NOT THINK ABOUT BEAR DANGERS
   4 SAFE
   5 VERY SAFE

10. Do you feel that you would know what to do if you encountered a grizzly bear?

   1 YES
   2 UNCERTAIN
   3 NO

11. Listed below are a number of hiking techniques for grizzly bear country. Please indicate how frequently you or other members of your group practiced each during your hike. Please be frank.

	How frequently did you: (Circle one)			
Make noise on trail	ALWAYS	USUALLY	SELDOM	NEVER
Hike in large groups (over 5)	ALWAYS	USUALLY	SELDOM	NEVER
Wear or use bear bells	ALWAYS	USUALLY	SELDOM	NEVER
Carry garbage out	ALWAYS	USUALLY	SELDOM	NEVER
Hike after dark	ALWAYS	USUALLY	SELDOM	NEVER

12. To what extent did you agree with the frequency with which your group:

	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	DISAGREE	STRONGLY
Made noise on trail	SA	A	N	D	SD	
Wore or used bear bells	SA	A	N	D	SD	

13. The following statements ask for your opinions about grizzly bears. Please circle the response which closely corresponds to your opinion.

	To what extent do you agree?					
	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	DISAGREE	STRONGLY
I think grizzly bears are essential to the balance of nature	SA	A	N	D	SD	
Seeing a grizzly bear in the wild would be one of the greatest outdoor experiences of my life . .	SA	A	N	D	SD	
Grizzly bears should be eliminated in areas outside of national parks	SA	A	N	D	SD	
To me, the grizzly bear symbolizes the beauty and wonder of nature	SA	A	N	D	SD	
I think grizzly bears are among the few animals who will kill for the pleasure of killing	SA	A	N	D	SD	
I think the hunting season on grizzly bears encourages more illegal killing of them	SA	A	N	D	SD	
Montana would be a nicer place to live if fewer dangerous animals, like grizzly bears were found here	SA	A	N	D	SD	
If oil or natural gas were discovered in grizzly habitat, the resource should be extracted even if it harmed bears	SA	A	N	D	SD	
It is the presence of grizzly bears that makes a wilderness experience so wonderful	SA	A	N	D	SD	
I believe so many grizzly bears are being illegally killed in Montana that if something is not done to stop it, the bear will soon disappear from the state	SA	A	N	D	SD	
I think when grizzly bears kill cattle and sheep they must be eliminated	SA	A	N	D	SD	
Because people and cattle live practically everywhere in the United States, and grizzly bears only in Montana and Alaska, I think Montana should make sacrifices when there is a conflict with the bear	SA	A	N	D	SD	
Agencies should provide more natural conditions for grizzly bears, even if this means more visitor restrictions	SA	A	N	D	SD	

	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE
I would very much like to see a grizzly bear in the wild	SA	A	N	D	SD
Some animals like grizzly bears, wolves, and rattlesnakes are naturally cruel	SA	A	N	D	SD
In my opinion, the grizzly bear is essential for keeping other plant and animal species in proper balance with nature	SA	A	N	D	SD
The current hunting season on grizzly bears confuses the public about the need to protect them .	SA	A	N	D	SD
If farmers were more careful about how they take care of their cattle, there would be fewer livestock killed by grizzlies . . .	SA	A	N	D	SD
I think it would be wonderful to see grizzly bear sign in the wild .	SA	A	N	D	SD

14. When hiking how difficult or easy do you find it to practice each of the following?

About how difficult or easy is it to:
(Circle the place that best represents your opinion)

	EASY				DIFFICULT
Make noise on trail					
Hike in large groups (over 5)					
Wear or use bear bells					
Carry garbage out					
Hike after dark					

15. We are interested in your knowledge of bears. Please indicate whether you feel each of the following statements is basically true, basically false, or if you are unsure. (Circle one answer)

	BASICALLY TRUE	BASICALLY FALSE	NOT SURE
Black bears usually have a "dish" shaped face . . .	T	F	NS
Bears are usually unpredictable in their behavior . .	T	F	NS
The color of grizzly bears may range from light brown to dark black	T	F	NS
Bears are usually shy	T	F	NS
Bears go into a deep sleep during winter months .	T	F	NS
Bears are primarily carnivores	T	F	NS
Grizzly bears have relatively poor eyesight	T	F	NS
Fewer than 1000 grizzly bears survive in the lower 48 states	T	F	NS
Hiking after dark is acceptable in bear country . .	T	F	NS
Dogs are useful in keeping bears away	T	F	NS

16. Backcountry management agencies have suggested a number of hiking techniques that hikers can use to reduce confrontations with grizzly bears. Please indicate how likely you feel each of the listed techniques will reduce confrontations with bears.

	Likelihood of reducing confrontations? (Circle one)				
	VERY LIKELY	LIKELY	UNLIKELY	UNLIKELY	VERY
Make noise on trail	VL	L	U	VU	
Hike in large groups (over 5)	VL	L	U	VU	
Wear or use bear bells	VL	L	U	VU	
Carry garbage out	VL	L	U	VU	
Hike after dark	VL	L	U	VU	

BACKGROUND INFORMATION

Finally, we have a few questions about you personally that provide information useful in management. Remember, you will not be identified with your answers, so please be frank.

17. What is your present age? _____

18. Are you?

1 MALE
2 FEMALE

19. What best describes the area in which you live?

1 LARGE CITY OVER ONE MILLION PEOPLE
2 MEDIUM CITY 50,000 TO ONE MILLION PEOPLE
3 SMALL CITY 5,000 TO 50,000 PEOPLE
4 TOWN 1,000 TO 5,000 PEOPLE
5 RURAL
6 FARM

20. What is the highest level of education you have completed so far?
(Circle one number)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 16+
ELEMENTARY HIGH SCHOOL COLLEGE

21. What is your occupation? (Please indicate what kind of work you do, not for whom you work. If you are a homemaker, student, or retired, please so indicate.)

_____

_____

Do you have any additional comments or suggestions on how to improve the management of this backcountry area? Any general comments?

PLEASE PLACE YOUR COMPLETED QUESTIONNAIRE IN THE STAMPED, SELF-ADDRESSED ENVELOPE PROVIDED AND DROP IN ANY CONVENIENT MAILBOX

THANK YOU FOR YOUR HELP
School of Forestry
University of Montana

APPENDIX E

BACKPACKER QUESTIONNAIRE

U N I V E R S I T Y O F M O N T A N A
School of Forestry
Missoula, Montana 59812

Backcountry Visitor Survey

Please answer all questions as they relate to your most recent backpacking trip in the Jewel Basin Hiking Area.

---

1. Was this your first visit to Jewel Basin Hiking Area? (Circle one number)

   1 YES (Please go to Question 2)
   2 NO (Please answer the following)

   Including your recent visit, about how many times have you backpacked in Jewel Basin?

   1 ONE TO THREE TIMES
   2 FOUR TO SEVEN TIMES
   3 EIGHT TO TWELVE TIMES
   4 OVER TWELVE TIMES

2. Prior to this visit, about how many backpacking trips have you taken in Glacier or Yellowstone National Parks, or in backcountry areas in Montana? (Circle one number)

   1 NONE
   2 ONE TO THREE TIMES
   3 FOUR TO SEVEN TIMES
   4 EIGHT OR MORE TIMES

3. What type of group did you travel with on **this** backpacking trip? (Circle one number)

   1 ALONE
   2 FAMILY
   3 FRIENDS
   4 FAMILY AND FRIENDS
   5 GUIDE OR OUTFITTER
   6 CLUB OR ORGANIZED GROUP

4. How many people were in your group including yourself?

   NUMBER OF PEOPLE _____

5. How many nights did you camp overnight in Jewel Basin on this visit?

   NUMBER OF NIGHTS _____

6. What type of equipment did you take on this trip? (Circle **all** numbers that apply)

   1 FISHING ROD
   2 ROPE
   3 FRESH FOOD
   4 AIR HORN
   5 KNIFE
   6 SAW OR HATCHET
   7 BEAR SPRAY
   8 FIRE ARM
   9 CANNED FOOD
   10 BEAR BELLS
   11 FREEZE DRIED/DEHYDRATED FOOD
   12 ODOR PROOF CONTAINER

7. What was the likelihood of seeing a grizzly bear on this trip? (Circle one number)

   1 EXTREMELY LIKELY
   2 VERY LIKELY
   3 MODERATELY LIKELY
   4 SOMEWHAT LIKELY
   5 NOT AT ALL LIKELY
   6 DON'T KNOW

8. When you were planning your backpacking trip into Jewel Basin, how close did you want to get to a grizzly bear? (Circle one number)

   1 NEVER WANTED TO SEE A GRIZZLY BEAR
   2 WANTED TO VIEW ONE FROM A GREAT DISTANCE
   3 WANTED TO GET CLOSE ENOUGH FOR A GOOD LOOK OR PHOTOGRAPH
   4 DIDN'T THINK ABOUT IT

9. To what extent do you feel grizzly bears represent a danger to backcountry campers in this area? (Circle one number)

   1 VERY INSIGNIFICANT DANGER
   2 INSIGNIFICANT DANGER
   3 SOME DANGER
   4 SIGNIFICANT DANGER
   5 EXTREMELY SIGNIFICANT DANGER
   6 DON'T KNOW

10. How safe did you feel while on this trip? (Circle one number)

    1 VERY UNSAFE
    2 UNSAFE
    3 DID NOT THINK ABOUT BEAR DANGERS
    4 SAFE
    5 VERY SAFE

11. Do you feel that you would know what to do if you encountered a grizzly bear in the backcountry?

    1 YES 2 UNCERTAIN 3 NO

12. Listed below are a number of backcountry camping techniques. Please indicate how frequently you or other members of your group practiced each during your backpacking trip. Please be frank.

	How frequently did you: (Circle one)			
Store food in trees	ALWAYS	USUALLY	SELDOM	NEVER
Make noise on trail	ALWAYS	USUALLY	SELDOM	NEVER
Camp or hike in large groups (over 5) . .	ALWAYS	USUALLY	SELDOM	NEVER
Wear or use bear bells	ALWAYS	USUALLY	SELDOM	NEVER
Wash dishes after each meal	ALWAYS	USUALLY	SELDOM	NEVER
Cook 300 feet away from campsite	ALWAYS	USUALLY	SELDOM	NEVER
Cook fish/bacon for meals	ALWAYS	USUALLY	SELDOM	NEVER
Use odor restrictive containers	ALWAYS	USUALLY	SELDOM	NEVER
Wear clean clothes while sleeping	ALWAYS	USUALLY	SELDOM	NEVER
Cook downhill from sleeping area	ALWAYS	USUALLY	SELDOM	NEVER
Camp away from animal or hiking trails	ALWAYS	USUALLY	SELDOM	NEVER
Carry garbage out	ALWAYS	USUALLY	SELDOM	NEVER
Hike after dark	ALWAYS	USUALLY	SELDOM	NEVER

13. To what extent did you agree with the frequency with which your group: (Circle One)

	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	DISAGREE	STRONGLY
Made noise on trail	SA	A	N	D	SD	
Stored food in trees.	SA	A	N	D	SD	
Wore or used bear bells	SA	A	N	D	SD	

14. The following statements ask for your opinions about grizzly bears. Please circle the response which closely corresponds to your opinion.

	To what extent do you agree?					
	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	DISAGREE	STRONGLY
I think grizzly bears are essential to the balance of nature	SA	A	N	D	SD	
Seeing a grizzly bear in the wild would be one of the greatest outdoor experiences of my life . .	SA	A	N	D	SD	
Grizzly bears should be eliminated in areas outside of national parks	SA	A	N	D	SD	
To me, the grizzly bear symbolizes the beauty and wonder of nature	SA	A	N	D	SD	
I think grizzly bears are among the few animals who will kill for the pleasure of killing	SA	A	N	D	SD	
I think the hunting season on grizzly bears encourages more illegal killing of them	SA	A	N	D	SD	
Montana would be a nicer place to live if fewer dangerous animals, like grizzly bears were found here	SA	A	N	D	SD	
If oil or natural gas were discovered in grizzly habitat, the resource should be extracted even if it harmed bears	SA	A	N	D	SD	
It is the presence of grizzly bears that makes a wilderness experience so wonderful	SA	A	N	D	SD	
I believe so many grizzly bears are being illegally killed in Montana that if something is not done to stop it, the bear will soon disappear from the state	SA	A	N	D	SD	

	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE
I think when grizzly bears kill cattle and sheep they must be eliminated	SA	A	N	D	SD
Because people and cattle live practically everywhere in the United States, and grizzly bears only in Montana and Alaska, I think Montana should make sacrifices when there is a conflict with the bear	SA	A	N	D	SD
Agencies should provide more natural conditions for grizzly bears, even if this means more visitor restrictions	SA	A	N	D	SD
I would very much like to see a grizzly bear in the wild	SA	A	N	D	SD
Some animals like grizzly bears, wolves, and rattlesnakes are naturally cruel	SA	A	N	D	SD
In my opinion, the grizzly bear is essential for keeping other plant and animal species in proper balance with nature	SA	A	N	D	SD
The current hunting season on grizzly bears confuses the public about the need to protect them .	SA	A	N	D	SD
If farmers were more careful about how they take care of their cattle, there would be fewer livestock killed by grizzlies . . .	SA	A	N	D	SD
I think it would be wonderful to see grizzly bear sign in the wild .	SA	A	N	D	SD

15. When backpacking how difficult or easy do you find it to practice each of the following?

	About how difficult or easy is it to: (Check the place that best represents your opinion) DIFFICULT	EASY
Store food in trees		
Make noise on trail		
Camp or hike in large groups (over 5)		
Wear or use bear bells		
Wash dishes after each meal		
Cook 300 feet away from campsite		
Cook fish/bacon for meals		
Use odor restrictive containers		
Wear clean clothes while sleeping		
Cook downhill from sleeping area		
Camp away from animal or hiking trails		
Carry garbage out		
Hike after dark		

16. We are interested in your knowledge of bears. Please indicate whether you feel each of the following statements is basically true, basically false, or if you are unsure. (Circle one answer)

	BASICALLY TRUE	BASICALLY FALSE	NOT SURE
Black bears usually have a "dish" shaped face . . .	T	F	NS
Bears are usually unpredictable in their behavior .	T	F	NS
The color of grizzly bears may range from light brown to dark black	T	F	NS

	BASICALLY TRUE	BASICALLY FALSE	NOT SURE
Bears are usually shy	T	F	NS
Bears go into a deep sleep during winter months .	T	F	NS
Bears are primarily carnivores	T	F	NS
Grizzly bears have relatively poor eyesight	T	F	NS
Fewer than 1000 grizzly bears survive in the lower 48 states	T	F	NS
Hiking after dark is acceptable in bear country . .	T	F	NS
Dogs are useful in keeping bears away	T	F	NS

17. Backcountry management agencies have suggested a number of camping and hiking techniques that backpackers can use to reduce confrontations with grizzly bears. Please indicate how likely you feel each of the listed techniques will reduce confrontations with bears.

	Likelihood of reducing confrontations? (Circle one)				
	VERY LIKELY	LIKELY	UNLIKELY	UNLIKELY	VERY
Store food in trees	VL	L	U		VU
Make noise on trail	VL	L	U		VU
Camp or hike in large groups (over 5) . .	VL	L	U		VU
Wear or use bear bells	VL	L	U		VU
Wash dishes after each meal	VL	L	U		VU
Cook 300 feet away from campsite	VL	L	U		VU
Cook fish/bacon for meals	VL	L	U		VU
Use odor restrictive containers	VL	L	U		VU
Wear clean clothes while sleeping	VL	L	U		VU
Cook downhill from sleeping area	VL	L	U		VU
Camp away from animal or hiking trails	VL	L	U		VU
Carry garbage out	VL	L	U		VU
Hike after dark	VL	L	U		VU

BACKGROUND INFORMATION

Finally, we have a few questions about you personally that provide information useful in management. Remember, you will not be identified with your answers, so please be frank.

18. What is your present age? _____

19. Are you?

1 MALE
2 FEMALE

20. What best describes the area in which you live?

1 LARGE CITY OVER ONE MILLION PEOPLE
2 MEDIUM CITY 50,000 TO ONE MILLION PEOPLE
3 SMALL CITY 5,000 TO 50,000 PEOPLE
4 TOWN 1,000 TO 5,000 PEOPLE
5 RURAL
6 FARM

21. What is the highest level of education you have completed so far?
(Circle one number)

1 2 3 4 5 6 7 8 — ELEMENTARY
9 10 11 12 — HIGH SCHOOL
13 14 15 16 16+ — COLLEGE

22. What is your occupation? (Please indicate what kind of work you do, not for whom you work. If you are a homemaker, student, or retired, please so indicate.)

_____

_____

Do you have any additional comments or suggestions on how to improve the management of this backcountry area? Any general comments?

PLEASE PLACE YOUR COMPLETED QUESTIONNAIRE IN THE STAMPED, SELF-ADDRESSED ENVELOPE PROVIDED AND DROP IN ANY CONVENIENT MAILBOX

THANK YOU FOR YOUR HELP
School of Forestry
University of Montana

APPENDIX G

Data Analysis Tables

Table 4. Size of community in which visitors resided by day hikers and backpackers, in percent.

Community	Day Hikers	Backpackers	Total
Large City (> 1,000,000)	8.8	4.4	8.3
Medium City (50,000 to 1,000,000)	14.5	11.8	14.2
Small City (5,000 to 50,000)	37.8	38.2	37.8
Town (1,000 to 5,000)	13.9	26.5	15.4
Rural	21.5	17.6	21.1
Farm	3.5	1.5	3.3

Table 5. Occupation by day hikers and backpackers, in percent.

Occupation	(N=511) Day Hikers	(N=69) Backpackers	(N=579) Total
Professional/Technical	42.5	46.4	43.0
Managers/Administration	11.0	5.8	10.4
Sales	3.5	5.8	3.8
Clerical	3.7	4.3	3.8
Craftsman	4.9	4.3	4.8
Transport	1.4	1.4	1.4
Laborers	2.0	1.4	1.9
Farm Workers	1.2	0.0	1.1
Service Workers	5.3	5.8	5.4
Student	9.2	18.8	10.4
Housewife	7.5	1.4	6.7
Retired	7.3	2.9	6.7
Military	0.2	0.0	0.2
Unemployed	0.4	1.4	0.5

Table 6. Type of group by day hikers and backpackers, in percent.

Group Type	(N=512) Day Hikers	(N=68) Backpackers	(N=380) Total
Alone	2.7	1.5	2.6
Family	41.6	33.8	40.7
Friends	26.0	51.5	29.0
Family/Friends	22.7	8.8	21.0
Guide/Outfitter	0.8	0.0	0.7
Club/Organized Group	6.3	4.4	6.0

Table 7. Mean visitor evaluation score in degree of easiness for recommended behaviors.

Behavior	Day Hikers	Backpackers	Total
Store Food in Trees	0.0	2.5	0.0
Make Noise on Trail	2.1	2.5	2.2
Hike in Large Groups (>5)	4.6	4.9	4.7
Wear Bear Bells	3.4	3.6	3.4
Wash Dishes After Meals	0.0	1.7	0.0
Cook 300 feet Away From Camp	0.0	4.2	0.0
Don't Cook Fish/Bacon	0.0	3.8	0.0
Use Odor-Proof Containers	0.0	2.6	0.0
Wear Clean Clothes Sleeping	0.0	2.6	0.0
Cook Downhill From Camp	0.0	3.4	0.0
Camp Away From Trails	0.0	3.2	0.0
Carry Garbage Out	1.4	1.6	1.4
Don't Hike After Dark	5.5	4.7	5.4

Table 8. Beliefs about the likelihood of appropriate behaviors reducing confrontation with grizzly bears by day hikers and backpackers, in percent stating the behavior is 'very likely'.

Behavior	Day Hikers	Backpackers	Total
Store Food in Trees	0.0	52.2	0.0
Make Noise on Trail	56.1	50.7	55.5
Hike in Large Groups (>5)	42.0	33.3	41.0
Wear Bear Bells	29.0	24.6	28.5
Wash Dishes After Meals	0.0	36.2	0.0
Cook 300 feet Away From Camp	0.0	33.3	0.0
Don't Cook Fish/Bacon	0.0	55.2	0.0
Use Odor-Proof Containers	0.0	34.8	0.0
Wear Clean Clothes Sleeping	0.0	29.0	0.0
Cook Downhill From Camp	0.0	16.4	0.0
Camp Away From Trails	0.0	26.1	0.0
Carry Garbage Out	59.5	59.4	59.5
Don't Hike After Dark	53.2	51.5	53.0

Table 9. Visitor knowledge about bears by day hikers and backpackers, in percent answering question correctly.

Quiz Item	Day Hikers	Backpackers	Total
Black bears usually have a dish shaped face	52.9	55.2	53.2
Bears are usually predictable in their behavior	46.4	43.5	46.1
Color of grizzly bear may range from light brown to dark black	66.7	68.1	66.9
Bears are usually shy	86.5	82.6	86.0
Bears go into deep in winter	79.5	85.5	80.2
Bears are primarily carnivorous	81.4	86.6	82.0
Grizzlies have relatively poor eyesight	65.8	68.1	66.1
Fewer than 1000 grizzlies survive in lower 48 states	60.4	71.0	61.7
Hiking after dark is acceptable in bear country	85.0	84.1	84.9
Dogs are useful in keeping bears away	67.5	63.8	67.1

Table 10. Subjective probability of encountering a grizzly bear by day hikers and backpackers, in percent.

Likelihood	Day Hikers	Backpackers	Total
Extremely Likely	1.2	1.5	1.2
Very Likely	3.1	1.5	2.9
Moderately Likely	8.6	19.1	9.8
Somewhat Likely	40.8	39.7	40.7
Not Likely	30.5	20.6	29.3
Don't Know	15.8	17.6	16.0

$X^2 = 9.72 \quad \propto = .08$

Table 11. Distance from which visitors wanted to view a grizzly bear by day hikers and backpackers, in percent.

Distance	Day Hikers	Backpackers	Total
Never wanted to see a grizzly bear	28.6	43.5	30.4
Wanted to see one from a great distance	36.9	36.2	36.8
Wanted to get close enough for a good look	6.3	4.3	6.1
Didn't think about it.	28.2	15.9	26.7

Person $X^2 = 7.38$ $\propto = .06$

Table 12. Feelings of safety while in the backcountry by day hikers and backpackers, in percent.

Level of Safety	Day Hikers	Backpackers	Total
Very Safe	31.1	24.6	30.3
Safe	57.9	66.7	59.0
DIdn't Think About It	5.1	1.4	4.7
Unsafe	4.1	5.8	4.3
Very Unsafe	1.8	1.4	1.7

Pearson's $X^2 = 3.42$ $\propto = .49$

Table 13. Significance of danger grizzly bears represent to visitors in Jewel Basin by day hikers and backpackers, in percent.

Level of Danger	Day Hikers	Backpackers	Total
Very Insignificant Danger	12.8	4.3	11.8
Insignificant Danger	17.5	15.9	17.3
Some Danger	48.8	59.4	50.1
Significant Danger	9.7	14.5	10.3
Extremely Significant Danger	1.9	1.4	1.9
Don't Know	9.1	4.3	8.6

Pearson's $X^2 = 7.90$ $\propto = .16$

Table 15. Mean external belief scores by day hikers and backpackers, in percent.

Belief	Day Hikers	Backpackers	Total
Ecologistic	3.96	3.93	3.96
Naturalistic	3.59	3.50	3.58
Moralistic	2.98	3.11	3.00
Negativistic	1.59	1.60	1.59

Table 16. Visitor behavioral intentions to participate in appropriate behavior by day hikers and backpackers, in percent stating they plan to "always" or "usually" engage in the recommended activity.

Behavior	(N=84) Day Hikers	(N=7) Backpackers	(N=91) Total
Store Food in Trees	0.0	57.1	0.0
Make Noise on Trail	65.5	71.4	66.6
Camp or Hike in Large Groups (>5)	17.9	0.0	16.5
Wear or Use Bear Bells	11.9	0.0	11.0
Cook 300 feet From Campsite	0.0	14.3	0.0
Don't Cook Fish/Bacon For Meals	0.0	100.00	0.0
Use Odor-Proof Containers	0.0	83.3	0.0
Wear Clean Clothes While Sleeping	0.0	83.3	0.0
Cook Downhill From Sleeping Area	0.0	0.0	0.0
Camp Away From Trails	0.0	100.0	0.0
Carry Garbage Out	100.0	100.0	100.0
Don't Hike After Dark	100.0	100.0	100.0

Table 17. Visitors' reported behavior by day hikers and backpackers, in percent indicating they "always" or "usually" engaged in the recommended activity. (Pretest group percentage)

Behavior	Day Hikers	Backpackers	Total
Store Food in Trees	0.0	82.6 (75.0)	0.0
Make Noise on Trails	87.7 (85.3)	88.4 (75.0)	87.8 (84.8)
Camp or Hike in Large Groups (>5)	29.4 (18.4)	25.0 (0.0)	28.9 (17.3)
Wear or Use Bear Bells	22.2 (12.0)	22.1 (0.0)	22.1 (11.3)
Wash Dishes After Each Meal	0.0	98.5 (100.0)	0.0
Cook 300 feet From Campsite	0.0	39.1 (0.0)	0.0
Don't Cook Fish/Bacon For Meals	0.0	69.6 (75.0)	0.0
Use Odor-Proof Containers	0.0	59.7 (75.0)	0.0
Wear Clean Clothes While Sleeping	0.0	68.2 (75.0)	0.0
Cook Downhill From Sleeping Area	0.0	45.5 (50.0)	0.0
Camp Away From Trails	0.0	67.7	0.0
Carry Garbage Out	97.4 (98.4)	97.1 (100.0)	97.4 (98.6)
Don't Hike After Dark	99.6 (100.0)	98.6 (100.0)	99.5 (100.0)

Table 18. Type of noise Jewel Basin visitors made when hiking, in perc

Noise Type	Day Hikers	Backpackers	Total
Talking	75.3	81.5	75.9
Bear Bells	19.6	18.5	19.5
Singing	2.3	0.0	2.0
Yelling	2.3	0.0	2.1
Whistling	0.2	0.0	0.2
Other	0.4	0.0	0.3

Table 19. Spearman's Rho Correlation Coefficients among three behavior scores and individual scale items.

	DB Level	Behavioral Intentions	Reported Noise	Reported Bells	Intentions Noise	Intentions Bells
Behavioral Institutions	.2546					
Reported Noise	.1496	.5504**				
Reported Bells	-.0004	.4182**	.3443*			
Intentions Noise	.1457	.7951**	.6084**	.0823		
Intentions Bells	.6166**	.4218**	.1682	-.0094	.2470	
Reported Behavior Score	.1159	.6197**	.7472**	.6171**	.3832**	.1582

** p = .001
* p = .01

Table 20. Mean increase decibel level by individuals receiving a written message and those individuals not receiving a message.

	Message	No Message	F Significance
Day Hikers	4.73	2.64	.0000
Backpackers	3.78	1.73	.0712
Total	4.61	2.57	.0000

Table 21. Mean increased decibel level, reported behavior and danger perceptions for individuals in the high fear, message version 1 and version 2.

	Version 1 (N=124)	Version 2 (N=55)	F Significance
Db Level	4.47	4.16	.5666
Reported Noise	3.23	3.21	.8581
Reported Bells	1.99	2.07	.2018
Danger	3.08	3.14	.7856
Safety	4.02	4.26	.1179

Table 22. Mean decibel levels for individuals receiving the high fear message, easy messages and control group.

	High Fear	Easy	Control	F. Significance
Day Hikers	4.52	4.74	2.83	.0000
Backpackers	3.41	4.84	1.00**	.0210
Total	4.38	4.84	2.66**	.0000

* - significant difference (.05) between high fear and easy (Tukey's HD)
** - significant difference from easy (Tukey's HSD)

Table 23. Mean decibel levels for individuals receiving the high fear message, ecologistic message and control groups.

	High Fear	Ecologistic	Control	F. Significance
Day Hikers	4.52	4.89	3.71*	.0175
Backpackers	3.41	4.16	2.94	.6471
Total	4.38	4.78	3.64*	.0165

* - significantly different (.05) from ecologistic (Tukey's HSD)

Table 24. Mean decibel levels for individuals who were offered bear bells at the trailhead.

	Borrowed Bells	Had Bells	Refused Bells	Other Treatments	F Significance
Day Hikers	4.42	4.54	3.59	4.07	.2794
Backpackers	3.25	0.00	1.5	4.07	.0858
Total	4.32	4.10	3.42	4.07	.1939

Table 25. Mean decibel levels for individuals who received a message exclusively, bells exclusively, a message and bells, and not treatment (control).

	Message	Bear Bells	Message and Bear Bells	Control	F Significance
Day Hikers	5.13**	2.20	4.43**	3.32	.0000
Backpackers	5.34**	4.67	1.5	1.0	.0002
Total	5.16*	2.34	4.15**	2.66	.0000

* - significantly different (.05) from bear bells, message and bells, and control
** - significantly different (.05) from bear bells and control
*** - significantly different (.05) from message and bells, and control
- all significance tests - Tukey's HSD>

Table 26. Mean reported food storage behavior for backpackers who brought rope and those who did not.

	Mean Reported Food Storage Score
Brought Rope	3.48
Did Not Bring Rope	3.06
F Significance	.1440

Table 27. Spearman's Rho Correlation Coefficients among the ecologistic, moralistic and naturalistic attitudes, knowledge about bears (GB) knowledge about appropriate behavior (BEH) and consequences of appropriate behavior (CAB).

	GB	BEH	Total Knowledge	CAB	ECOL	NAT
BEH	.2848**					
Total Knowledge	.9514**	.5661**				
CAB	.0481	-.1085	.0065			
ECOL	.0605	.0100	.0552	.0112		
NAT	.1163*	-.0472	.0848	.0098	.6049**	
MORAL	.005	-.0147	.0000	.0637	.6509**	.4865**

* p = .01
** p = .001

Table 28. Mean behavior scores for individuals who received the ecologistic message by their ecologistic score.

	Ecologistic Score					
	Very Low	Low	Moderate	High	Very High	F Significance
Db Level	7.0	5.8	4.93	4.69	4.0	.9802
Reported Noise	3.5	3.0	3.09	3.23	3.14	.7816
Reported Bells	2.0	1.0	1.73	1.59	1.57	.5093
Total Reported Behavior	2.9	2.75	2.90	2.91	2.83	.8977

Table 29. Mean Behavior Scores for individuals who received the high fear message by their negativistic belief score.

	Negativistic Score					
	Very Low	Low	Moderate	High	Very High	F Significance
Db Level	3.45	3.81	4.2	3.25	2.0	.8613
Reported Noise	3.5	3.24	3.67	2.5	3.5	.0841
Reported Bells	1.68	1.56	2.0	2.25	4.0	.1147
Total Reported Behavior	3.04	3.17	3.27	3.13	2.77	.6231

Table 30. Mean Behaviore Scores for individuals who received the easy message by their evaluation of that behavior as easy or difficult.

	Evaluations of Behavior							
	Easy 1	2	3	4	5	6	Difficult 7	F Significance
Db Level[a]	4.72	5.22	4.00	5.86	2.6	2.0	2.67	.3859
Reported Noise[a]	3.46*	3.25	3.11	2.79**	2.4**	3.0	2.33**	.0001
Reported Bells[b]	2.36*	1.55	1.17*	1.38**	1.14**	1.08**	1.0**	.0000
Total Reported Behavior[c]	3.14*	2.91	2.63**	2.86	2.77	2.94	2.69	.0219

* - significantly different (.05) from ** at .05 level (Tukey's HSD)

a - analysis based on evaluation making noise as easy or difficult
b - analysis based on evaluation of wearing bells as easy or difficult
c - analysis based on evaluation of all behaviors as easy or difficult

Table 31. Summary of Hypotheses Testing

Hypothesis	Results
Three behavior scores positively correlated.	Supported, but not significant
Compliance greater for individuals receiving written message	Supported
Compliance greater for individuals receiving a high fear message than those receiving an easy message	Not supported
Compliance greater for individuals receiving ecologistic message than those receving high fear message	Not supported
Noise making greater for individuals receiving bear bells at trailhead	Not supported
Greater compliance in food storage for campers who had rope than those who did not	Not supported
Ecologistic, moralistic, and naturalistic attitudes positively correlated with knowledge of appropriate behaviors	Not supported
Compliance greatest for individuals with ecologistic attitude who receive ecologistic message	Not supported
Compliance greatest for individuals with negativistic attitude who receive a high fear message	Not supported
Compliance greatest for individuals rating behaviors as easy and given easy message	Supported for reported behavior, but actual behavior had no significant differences
Compiance greatest for individuals exposed to a combination of strategies than a single strategy	Not supported